MODELLING AND SIMULATION OF MULTIPLE SINGLE – PHASE INDUCTION MOTORS IN PARALLEL CONNECTION

Abstract

A mathematical model for parallel connected n-multiple single-phase induction motors in generalized state-space form is proposed in this paper. The motor group draws electric power from one inverter. The model is developed by the dq-frame theory and was tested against four loading scenarios in which satisfactory results were obtained.

Keywords : single-phase induction motor, multiple, parallel connection, modelling

นักเสียงดีโล่งห้องนิภัณฑ์ที่ใช้ไว้สำหรับเทคนิคเพิ่มความดันสูง

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บทสรุป

การประดิษฐ์สิ่งของที่ช่วยให้บัลลังศักดีถิ่นห้องนิภัณฑ์สำหรับเทคนิคเพิ่มความดันสูง บัลลังศักดีที่ประดิษฐ์ คิดค้นขึ้นเป็นนักเสียงดีโล่งห้องนิภัณฑ์ด้วย มีโครงสร้างหลักแบบวงโซนชิ้นเสียบเคอร์ชินิตะบังคับ บังคับ

สายเข้าเป็นสมรรถนะในการเรียกร้องโดยทุกการส่งผ่านกลั่นไฟฟ้าไปยังห้องลดด้วยการควบคุมความถี่การ

สวิตช์ อุปกรณ์สวิตช์ที่ถูกใช้เป็นสองพอดแค่คงประกอบขึ้นเป็นพู่บริเวณเครื่องด้วย บัลลังศักดีล่องชิ้นเสียบ

ตามการประดิษฐ์นี้สามารถจุดห้องลดจากภูมิอากาศของภูมิอากาศได้ท่าจะมุ่งหมาย พื้นที่เกิดกับห้องลดเป็นการ

ยืดหยุ่นการใช้งานให้กับห้องลดที่มีการแยกไม่ให้ห้องลดส่งภูมิเตรียมที่มีการเปลี่ยนแปลงสภาพความชื้น ให้ค่าด้าน

ประกอบย่อม 0.90 สามารถประหยัดกลั่นไฟฟ้าได้ถึง 32.87% จากการลดทอนเหล้งงานชิ้นแทน บัลลังศักดี

อีลักษณะล่องชิ้นเสียบของการประดิษฐ์นี้สามารถเจริญได้ ทำให้ความควบคุมระหว่างของห้องลดได้ในอั้น 30-

100% ของค่าพิเศษความยาว ดังกล่าวถ้าการกินกลั่นไฟฟ้าเลือกของชุดบัลลังศักดีให้ได้ในอั้น 52-100% ซึ่ง

เป็นประเด็นสำคัญที่มีความจำเพื่อการประหยัดพลังงานเพิ่มเติม

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บทสรุป

ผลคัดหลู่ (1) ของการประดิษฐ์นี้ ประกอบไปด้วยตัวเรื่อง (2) ซึ่งเป็นโครงสร้างแข็งแรง สามารถรองรับหนัก อุปกรณ์ประกอบได้ทั้งหมด ตัวเรื่อง (2) ทางด้านหนึ่งมีโครงแบบเดี่ยว (2a) และวงจรขับเคลื่อนทางโซค่า ที่ได้รับการจัดรูปร่างจากแบบและบาน (2a1) สุนทรีย์การปรับระดับพื้นฐาน (4a) ด้านหน้าของตัวเรื่อง (2) มีโครงแบบเดี่ยว (2b) มีล้อหน้า (2c) ที่ขับโดยมอเตอร์และมีถังคล้ายอิสระ (2a) ช่วยพื้นฐาน (2) ให้มีเสถียรภาพ บริเวณกลางตัวเรื่อง (2) มีชุดเครื่องและเครื่องยนต์ (crank and rocker) (3) สุนทรีย์การนำบังคับชุดเครื่องไปมิลลิปัตติด (3a) ได้สามารถนำไปทางข้าง ทางข้างจะติด การสั่นทางบังคับ (3a) ไปทำคีย์เป็นมุม 45 องศา และนำไปทางข้างได้เป็นมุม 45 องศาด้าน ชุดเครื่องและเครื่องยนต์ (3) มีมัดเป็นหุ้นอยู่ม่อเดียว (3a) ใช้เป็นตัวขับเคลื่อนชุดเครื่องและเครื่องยนต์ (3) ในการสั่นชุด ไปมิลลิปัตติด (3a) ม่อเดียว (3b) ทำหน้าที่ส่งแรงดันชุดเครื่อง (3c) เพื่อหมุนชุดไปมิลลิปัตติด (3a) ชุดเครื่อง (3c) สามารถ ปรับตัวแทนการจัดให้สามารถปรับความสั่นช้าให้เหมาะสมในการกัดหนุนหรือกั้นไป ด้านหนึ่งของชุดเครื่องและเครื่อง เรื่อง (3e) เมื่อปรับให้อยู่ในแนวระบาย ใช้เพื่อการกัดหนุนในแนวระบาย ชุดเครื่องและเครื่องยนต์ (3) จะถูกปรับให้ตัวเรื่อง กับพื้น เมื่อต้องการกัดเดี่ยวที่ไม่ได้แนวระบายและชุดไปมิลลิปัตติด (3a) สามารถนำไปเป็นมุม +45 องศา ได้ตามปกติ การปรับมุมและระบายความสูญชุดเครื่องและเครื่องยนต์ (3) ทำได้โดยอาศัยตัวเรื่อง (3e) ซึ่งมีโอกาสสัมผัสกับตัวเรื่อง การใช้งานระดับหญิง (1) ใช้สำหรับการแก้ไขภูมิคุณ (4e) เมื่อผู้ใช้โดยบริเวณ มาที่ด้านหนึ่ง (4c1) ระดับหญิง (1) จะเคลื่อนตัวไปข้างน่า หากต้องการใช้เพื่อกลยุทธ์ ลูกที่ด้านหนึ่ง (4c2) หากต้องการหมดลงใช้โดยบริเวณ มาที่ ด้านหนึ่ง (4c3) ความเร็วในการเคลื่อนตัวของระดับหญิง (1) ปรับระดับได้โดยใช้ภูมิคุณ (4c4) บริเวณ (4c5) ใช้คลังค์ไว้ในต้องการใช้ยืดหยุ่น และบริเวณ (4c6) เมื่อต้องการให้ยืดหยุ่น บนผนังภูมิคุณ (4e) มีส่วนแสดงผล (5a) ที่บอก ระดับหลังเกี่ยวกับตัวเรื่องวิธี ควรชี้แจงและ.Delete ฯ ใช้ทางบังคับ (4c7) ฝึกสุนทรีย์การทำทาง (5b1) ทดลองให้พบ ที่นายเกิดสั่งว่า ถ้าเป็นขณะชุดโครงแบบเดี่ยวต้องใช้กับสัมผัส (5b2) ทดลองให้กั้นที่จะทำให้ชี้แจงชดใช้ทางการเชิง นอกจากนี้ยังมีช่อง (5c1) ให้ต่อให้ 12 โวลต์ จากแบบเดี่ยวไปใช้งานนอกประสงค์ได้ และมีช่อง (5c2) สำหรับระบบสั่งว่าใช้ลูกเล่น

สิทธิบัตร : เอกสาร 0801000079, 18 กุมภาพันธ์ 2551
Abstract

This article presents the winding design and construction for a sextupole magnet of the synchrotron light source storage ring on Thailand (Siam Photon Source) upgrade from 1.0 GeV to 1.2 GeV to produce an x-ray emission. It is designed to absorb magnetomotive force of 2,200 A-turns ratings while maintaining the coil temperature below 60°C. The design utilizes various software packages: Accelerator Toolbox was used for sextupole excitation current calculation, POISSON and RADIA for 2D and 3D magnetic field calculations, and COSMOSWorks™ for coil temperature calculation. The calculated and measured results are compared. The magnetic field measurement was carried out by the automatic three-axis magnetic field measurement system developed in-house. The new winding functions well according to the required ratings.
Abstract

This paper presents analysis of effects of distributed generation (DG) from renewable energy sources on power distribution security. This research focuses on power distribution systems, especially 22 kV level, which is the Provincial Electricity Authority of THAILAND (PEA) standard for electric power feeders. Security evaluation is simply defined by using the performance index which reflects risk of supply interruption to probably cause wide-area blackout. This paper employs the standard 37-node 4.8 kV IEEE test feeder and the 22 kV SUT feeder for Suranaree University of Technology as two test systems. As a result, installing DG with optimal reactive power generation can lead an electrical power system to operate with high security level. Remarkably, this reduces risk of power supply interruption.
การระบุอักขร์เส้นละเอียดด้วยวิธี DQF (DQ axis with Fourier method) สําหรับวิเคราะห์ทางไฟฟ้า

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บทคัดย่อ

บทความนี้นำเสนอวิธีการระบุอักขร์เส้นละเอียดด้วยวิธี DQF (DQ axis with Fourier method) ซึ่งเป็นการเสนอชื่อวิธี DQ axis (วิธี DQ) และวิธี Sliding Window Fourier Analysis (วิธี SWFA) วิธีการใหม่ที่นำเสนอแนวมากับการใช้งานกว้างขวางของกล้องเอกพิเศษ เพื่อกําจัดอักขร์เส้นในระบบไฟฟ้าแบบเพลิงสีสาย. ในบทความนี้การจําลองงานสถานการณ์การกําจัดอักขร์เส้น โดยมีการปรับเปลี่ยนผลการกําจัดอักขร์เส้นที่ใช้การระบุอักขร์เส้นละเอียดด้วยวิธี DQ วิธี SWFA และวิธี DQF นอกจากนี้ยังมีการทดสอบที่ความสมดุลหลักการกําจัดอักขร์เส้นในกรณีที่ระบบมีความไม่สมดุลกิจหนึ่ง ซึ่งจากการจําลองงานสถานการณ์พบว่าวิธี DQF ให้ผลการกําจัดอักขร์เส้นที่ตัดที่สุด และสามารถรักษาความสามารถสมดุลของระบบไฟฟ้าแบบเพลิงด้วยกําจัดอักขร์เส้นได้ดีที่สุดด้วยเช่นกัน

คําสั่งหุ้น: การระบุอักขร์เส้นละเอียด การกําจัดอักขร์เส้น วงจรวงการกล้องเอกพิเศษ ความสมดุลเพลิง ระบบไฟฟ้าแบบเพลิง

ทิศทางใหม่: วิธีการจับอักขร์ส่งเสริมลักษณะและเทคโนโลยี, ปีที่ 28, ฉบับที่ 6, พฤศจิกายน – ธันวาคม 2549 หน้า 1317-1334
การตรวจสอบการใช้คอมพิวเตอร์ในกล้าร่วมกิจการผลิตที่มีกิจกรรมการผลิตที่มีความซับซ้อนมาก

บทคัดย่อ

บทความนี้ได้นำเสนอถึงข้อมูล การตรวจสอบการใช้คอมพิวเตอร์ในกล้าร่วมกิจการผลิตที่มีความซับซ้อนมาก การจำลองสถานการณ์การจำลองสถานการณ์ของบทความนี้ใช้คอมพิวเตอร์ที่มีประสิทธิภาพสูงมาก การจำลองสถานการณ์การจำลองสถานการณ์ของบทความนี้ใช้คอมพิวเตอร์ที่มีประสิทธิภาพสูงมาก (Power System Blockset: PSB) ของโปรแกรม MATLAB ซึ่งการจำลองสถานการณ์ดังกล่าวได้ใช้โปรแกรมของวงจรการจำลองกล้าร่วมกิจการผลิตที่มีความซับซ้อนมาก

คำสั่งปริญญา: การตรวจสอบการใช้คอมพิวเตอร์ในกล้าร่วมกิจการผลิตที่มีความซับซ้อนมาก

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DISTRIBUTIONS OF FLUX AND ELECTROMAGNETIC FORCE IN INDUCTION MOTORS:
A FINITE ELEMENT APPROACH

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Abstract

This paper explains the numerical modelling of magnetic field for a squirrel-cage induction motor fed by various voltage sources. The aim of the work is to gain an insight of the flux and magnetic force distributions through the cross-sectional area of an induction motor. A two-dimensional nonlinear time-stepping finite element method (FEM) is used for electromagnetic field approximation in the motor operating with full-load steady-state rotor revolution. To solve this time-dependent problem, numerical backward-difference integration is applied. Due to the saturation characteristic of the magnetic materials, the combined Newton-Raphson (N-R) and bi-conjugate gradient (BCG) method is employed to handle the nonlinearity, and to solve the linearized equations. Extensive computation was conducted against a three-phase, four-pole, 5-hp, squirrel-cage induction motor with double layer winding fed by three different sources to assess our modelling and computing approaches. Our computing task was divided into three cases according to motor’s excitations: i) a purely sinusoidal source, ii) a PWM voltage-source-inverter (VSI), and iii) a six-step VSI. Moreover, the paper presents the results and discussions on the space-time distribution of electromagnetic forces resulting from the magnetic flux acting on the stator teeth around the air-gap.

Abstract

This paper illustrates a numerical approach to magnetic field modelling for a squirrel-cage induction motor fed by various voltage sources. A two-dimensional nonlinear time-stepping finite element method (FEM) is used for electromagnetic field approximation in the motor operating with full-load steady-state rotor revolution. To solve this time-dependent problem, numerical backward-difference integration is applied. Due to the saturation characteristic of the magnetic materials, the combined Newton-Raphson (N-R) and bi-conjugate gradient (BCG) method is employed to handle the nonlinearity, and to solve the linearized equations. To evaluate our proposed modelling and solving strategy, extensive computation was conducted against a three-phase, four-pole, 5-hp, squirrel-cage induction motor with double layer winding fed by three different sources. Our computing task was divided into three cases according to motor’s excitations: i) an ideal voltage source, ii) a PWM voltage-source-inverter (VSI), and iii) a six-step VSI. Displaying the flux-line plot gives an insight to the magnetic flux distribution through the cross-sectional area of the induction motor. Moreover, the paper discusses about the space-time distribution of electromagnetic forces resulting from the magnetic flux acting on the stator teeth around the air-gap.

ARTIFICIAL NEURAL NETWORK APPROACH TO ELECTRIC FIELD APPROXIMATION AROUND OVERHEAD POWER TRANSMISSION LINES

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Abstract

This paper presents the use of artificial neural networks (ANN) to estimate electric fields around an overhead power transmission line. Although, there exist many efficient numerical methods, e.g. finite difference method (FDM), finite element method (FEM), boundary element method (BEM), etc, to estimate electric field distribution caused by live conductors, it typically consumes substantial execution time when high accuracy of obtained solutions is required or especially when time-varying field is involved. Therefore, to estimate the electric field strength using ANN employing feedforward network with backpropagation learning can be an alternative.

To evaluate its use, overhead 22-kV single-phase power line of 100 m$^2$ test area and 230-kV three-phase power lines of 400 m$^2$ test area were simulated. The results obtained from the ANN are compared with those obtained by the analytical method, the FDM and the FEM.

EFFECTS OF THE GEOMETRY OF THE ROTOR SLOTS ON THE MECHANICAL VIBRATION OF THREE-PHASE INDUCTION MOTORS

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Abstract

This paper presents the development of mathematical models and simulations of magnetic field, and mechanical vibration in a three-phase squirrel-cage induction motor. Its aim is to compare the vibration magnitude when the motor possesses different geometrical rotor-slot shapes. The cross sectional areas of two typical semi-closed slot shapes (rectangular and round shapes) are kept equally constant according to the IEEE standard. Under an assumption of sinusoidal motor excitation, the simulation works employ the finite element method (FEM) and the Newton-Raphson method to solve time varying nonlinear equations. The numerical solutions obtained indicate the electromagnetic force distribution over the motor cross sectional area. Such forces cause mechanical vibration in the motor. To evaluate this vibration, the displacement of stator inner perimeters was observed carefully. As a result, the round rotor slot gives 4.8% less vibration than the rectangular rotor slot does.

Abstract

This paper presents exploitation of the finite difference method (FDM) to estimate electric fields resulting from an overhead power transmission line. The proposed analysis not only investigates the electric field intensity of the power line, but also examines interference caused by a mobile phone operation, sending an outgoing call. By using the FDM, electric field distribution around a human and his/her mobile phone can be graphically presented. This could reveal comprehensive effects of using the mobile phone underneath the power line on the mobile phone user. For demonstration, a 69-kV, 50-Hz overhead power transmission line supported by a H-frame tower is employed for a case study. Area of $8 \times 12$ m$^2$ underneath the power line is discretized as a simulation domain. As a result, electric flux lines around a human with sending outgoing call is very steep sloped and have a descent direction towards the human who is using the mobile phone.

ELECTRIC FIELD ESTIMATION AROUND AN OVERHEAD POWER TRANSMISSION LINE USING NEURAL NETWORK MODEL

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Abstract

This paper presents the use of artificial neural networks (ANN) to estimate electric fields around an overhead power transmission line. Although there exist many efficient numerical methods, e.g. finite difference method (FDM), finite element method (FEM), boundary element method (BEM), etc, to estimate electric field distribution caused by live conductors, it typically consumes substantial execution time when high accuracy of obtained solutions is required or especially when time-varying field is involved. Therefore, to estimate the electric field strength using ANN employing feedforward network with backpropagation learning can be an alternative. To evaluate its use, an overhead single-phase power line of 100 m² test area was simulated with 22 kV standard distribution level of Thailand. The results obtained from the ANN are compared with those obtained by the analytical method, the FDM and the FEM.

Abstract
This paper presents a way to obtain parameters of a direct-axis equivalent circuit of a synchronous
generator from frequency response data using bi-objective genetic algorithms. The genetic algorithms is capable
of finding a global minimum within a given search interval. The sum square error of magnitude and phase of the
d-axis equivalent circuit transfer function to formulate a bi-objective optimization problem is minimized to best
fit the measured data extracted from the frequency response test of the machine. As a result, exploitation of the bi-
objective optimization based on Genetic Algorithms gives very good results than those of using either the
magnitude or the phase as a single objective.
Abstract

This paper describes an intelligent approach to estimate parameters of a direct-axis equivalent circuit of a synchronous generator from frequency response data using bi-objective intelligent optimization methods, genetic algorithms and adaptive tabu search. The genetic algorithms and adaptive tabu search are capable of finding a global minimum within a given search interval. The sum square error of magnitude and phase of the d-axis equivalent circuit transfer function to formulate a bi-objective optimization problem is minimized to best fit the measured data extracted from the frequency response test of the machine. As a result, exploitation of the bi-objective optimization based on genetic algorithms and adaptive tabu search give very good results than those of using either the magnitude or the phase as a single objective. This confirms the effectiveness of the intelligent approach for solving bi-objective optimization problems described in this paper.

STUDIES OF MECHANICAL VIBRATIONS AND CURRENT HARMONICS IN INDUCTION MOTORS USING FINITE ELEMENT METHOD

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Abstract

This paper illustrates a numerical approach to magnetic field modeling for a squirrel-cage induction motor fed by various voltage sources: i) an ideal sinusoidal source, ii) a PWM voltage-source-inverter (VSI), and iii) a six-step VSI. A two-dimensional nonlinear time-stepping finite element method (FEM) is used for electromagnetic field approximation when the motor is under a full-load steady-state revolution. To solve this time-dependent problem, the numerical backward-difference integration is applied. Due to the saturation characteristic of the magnetic materials, the combined Newton-Raphson (N-R) with bi-conjugate gradient (BCG) method is employed to handle the nonlinearity and to solve the linearized equations. The approach has been applied to evaluate the mechanical vibrations of the motors in association with the geometry of the rotor slots. Also, the effects of nonsinusoidal supply voltages on the current harmonics have been investigated.

THE DQ AXIS WITH FOURIER (DQF) METHOD FOR HARMONIC IDENTIFICATION

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Abstract

This letter proposes the DQ axis with Fourier (DQF) method for harmonic identification. The method, when used with a parallel active power filter, provides much better results than its predecessors, namely the DQ axis and the sliding window Fourier analysis (SWFA) methods, in terms of harmonic elimination, and phase balancing.

Published in: IEEE Transactions on Power Delivery, January 2007, Volume 22, Number 1, pp. 737-739.
ADAPTIVE TABU SEARCH AND APPLICATIONS IN ENGINEERING DESIGN

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Abstract

This chapter presents detailed step-by-step description of an intelligent search algorithm namely Adaptive Tabu Search (ATS). The proof of its convergence, and its performance evaluation are illustrated. The chapter demonstrates the effectiveness and usefulness of the ATS through various engineering applications and designs in the following fields: power system, identification, and control.

Keywords: Adaptive tabu search, convergence, performance evaluation, identification, neuro-tabu-fuzzy control.

LEARNING CONTROL VIA NEURO-TABU-FUZZY CONTROLLER

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Abstract

The paper presents a novel search algorithm named adaptive tabu search (ATS). The algorithm has been applied to enhance the learning process of neural networks. The paper presents a new neuro-tabu-fuzzy (NTF) control structure to demonstrate the capability of the ATS algorithm. The algorithm is general and can be applied to various problems including machine learning, optimization, etc. Our proposed algorithm and controller nicely stabilize the single- and double-inverted pendulum systems.

OBTAINING AN OPTIMUM PID CONTROLLER VIA ADAPTIVE TABU SEARCH

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Abstract

An application of the Adaptive Tabu Search (ATS), an intelligent search method in industrial control domain, is presented. The ATS is used to search for the optimum controller’s parameters denoted as proportional, integral, and derivative gains. The obtained controllers are tested against some hard-to-be-controlled plants. The results obtained are very satisfactory.

Published in: Lecture Notes in Computer Sciences, 2007, 4432:747-755 (online)
OPTIMIZED PERFORMANCE OF A 2-MASS ROTARY SYSTEM USING ADAPTIVE TABU SEARCH

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Abstract

A 2-mass rotary system is common in industrial practice. This kind of systems usually encounters a torsional resonance problem. The attempt offered by this paper to suppress torsional resonance and to improve the system performance utilizes two-degree-of-freedom (2-DOF) control structure. Feedforward and feedback compensators are obtained from transfer function synthesis. To optimize overall system performance, the adaptive tabu search (ATS) is applied to locate the optimum poles and zeros of both compensators. Very high quality response has been achieved with resonance completely suppressed. Robusted stability and performance have been assessed by Monte Carlo method.

Keywords: 2-mass rotary system, torsional resonance, pole-zero assignment, adaptive tabu search, robustness, Monte Carlo method.

Published in: WSEAS Transactions on Circuits and Systems Issue 3, Vol. 5. March 2006, ISSN: 1109-2734
PARALLEL-CONNECTED SINGLE – PHASE INDUCTION MOTORS: MODELLING AND SIMULATION

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Abstract

The development of a state-space model representing multiple single-phase induction motors in parallel connection is described in this paper. The proposed model is in a general expression based on the dq-frame principle. The model of a multi-motor system becomes a large sparse matrix. A set of parallel motors is assumed to be fed by a single inverter source. Practical cases of having almost the same motors, the same loads, different motors with near ratings, and different loads have been considered. Simulation results on four drive conditions are discussed in details.

Keywords: single-phase induction motor, parallel connection, modelling.

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ISSN : 1109-2734, pp 377-384
IMAGE APPROACH TO SYSTEM IDENTIFICATION

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Abstract

Conventional system identification requires sensor(s) to record input(s) and output(s) of a system. Under some circumstances, hazardous environment and/or confined area for instance, sensor installation may be difficult or even not possible. This paper proposes a new approach to system identification via image processing techniques that permit non-intrusive and remote identification. One (or more) camera(s) can be an alternative to conventional sensors. Recorded images contain a great deal of useful dynamical information of the system. Details of information extraction from images are presented in this paper. For linear models, conventional identification techniques based on regression analysis are applied. For nonlinear models, the adaptive tabu search (ATS), one of the AI search techniques, is employed. The approach has been tested against the cart-plus-pendulum (CPP) system, and the vibrating tube system (VTS), respectively. Practical results have been achieved with high satisfaction.

Keywords: system identification, image processing, adaptive tabu search, cart-plus-pendulum system, vibrating tube system.

Published in: WSEAS TRANSACTIONS ON SYSTEMS, Issue 5, Vol. 5, May 2006,
ISSN : 1109-2777
This paper presents a management approach applied to search algorithms to achieve more efficient search. It acts as a management agent to a core search unit, in which the Adaptive Tabu Search (ATS) has been applied. The proposed management agent composes of partitioning mechanism (PM), sequencing method (SM), and discarding mechanism to speed up the search. It has been tested against Bohachevsky’s, Rastrigin’s and Shekel’s foxholes functions, respectively, for surface optimization. The paper gives a review of the ATS, detailed explanations of the PM, SM, and DM, respectively. Comparison of the optimization results are elaborated.
ADAPTIVE WIENER FILTER BASED NUMERICAL FILTER WITH AN APPLICATION TO BEAM POSITION MONITORING

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Abstract

This article proposes a numerical filter having an adaptive Wiener filter (AWF) as its main component. It presents detailed investigation of the performances of the Savitzky-Golay filter (SGF) and the AWF. As a result, the AWF is superior to the SGF in terms of less distortion of the filtered waveform. The desired signal fed to the AWF can be selectively generated by using a Butterworth filter, a Savitzky-Golay filter, and a downloaded waveform, respectively. User can easily choose filter’s parameters to suit their applications via a user-interface module. The proposed filter is simple, rapidly computable, and efficient to suppress noise. An application to the Siam Photon Source (Synchrotron Radiation Unit on Thailand) is also described. The filters coded in C are listed in the appendices and downloadable from our web site.

Keywords: noise, adaptive Wiener filter, Butterworth filter, Savitzky-Golay filter, Siam Photon Source

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SUT-CARG CAR-LIKE ROBOTS: THEIR ELECTRONICS AND CONTROL ARCHITECTURE

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Abstract
This article presents the development of the SUT-CARG car-like robot system. CARG car-like robots consist of four mobile robot agents and are built as integrated systems with IR, sonar, ultrasonic, vision sensors and controller modules. Hardware details are given. The software interface module for commanding the robots is described. The article also presents the details of robot following control which utilizes geometrical control approach based on vision and image processing. Colour tracking and flocking of the robot agents are demonstrated (VDO available online http://www.sut.ac.th/engineering/electrical/carg/).

Keywords: Car-Like Robot, Visual Servo, Image Processing, Colour Tracking, Robot Following Control, Flocking.

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Volume 7, June 2008
ADAPTIVE SLIDING-MODE LOAD-TORQUE OBSERVER: ITS STABILITY ASPECTS

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Abstract

This article reveals the detailed analyses of the uniform stability and the transient stability of an adaptive sliding-mode load-torque observer. Using the Lyapunov’s direct method, the stability can be concluded only in some time intervals during transient state. Using the LaSalle’s invariance principle, it can be concluded that by the end of the transient state the observer definitely enters the stable steady-state.

ANALYSIS OF TRANSIENT-STATE STABILITY OF A SLIDING-MODE SPEED OBSERVER

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Abstract

A recent development of an adaptive sliding-mode speed observer ensures stability in the Lyapunov sense under steady-state operation. To assess its stability during transient state is vital for a practical observer. Based on the Lyapunov’s direct method, one possible analysis is to determine two important solutions corresponding to a quadratic inequality concerning angular acceleration of the rotor. As a consequence, the theorem of LaSalle’s invariant set has been applied to explain stability scenario since prior ending of transient state up to steady state. During transient state, the time derivative of Lyapunov function \( \dot{V} \) may be either positive or negative. This means that the observer may become momentarily unstable because mechanical dynamics could prominently appear in \( \dot{V} \). The paper presents detailed analysis together with simulation results.

ADAPTIVE SLIDING-MODE SPEED-TORQUE OBSERVER

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Abstract

This paper proposes a new development of an adaptive sliding-mode speed-torque observer for an induction motor. Due to its adaptive nature combined with core loss consideration, the observer is able to provide very accurate estimations of speed and torque simultaneously. Its stability is guaranteed by Lyapunov criterion. Simulation results are presented to confirm their effectiveness.

TRANSIENT STABILITY OF AN ADAPTIVE SLIDING-MODE LOAD TORQUE OBSERVER

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Abstract

This article reveals the detailed analysis of the stability of an adaptive sliding-mode load torque observer. Using the Lyapunov’s direct method, the stability can be concluded only in some time intervals during transient state. Using the LaSalle’s invariance principle, it can be concluded that by the end of the transient state the observer definitely enters the stable steady-state.

The recent adaptive sliding-mode speed observer is stable in the Lyapunov sense under a constant speed condition. During transient state, this observer may become momentarily unstable because mechanical dynamics could prominently appear in the time derivative of Lyapunov function $V$. In effect, $V$ may be either positive or negative. A feasible analysis of the transient stability of this observer is to determine two important solutions according to the quadratic inequality concerning angular acceleration of the rotor. As a consequence, the theorem of LaSalle’s invariant set is employed to explain stability scenario since prior ending of transient state up to steady state. Some simulation results are shown to indicate whether this observer is stable during the transient state.

COMBINED SLIDING-MODE SPEED-TORQUE OBSERVER

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Abstract

This paper proposes a new load torque observer and a speed observer that takes core loss of the induction motor into account. These observers in adaptive sliding mode operation can provide very accurate estimations. They are connected in cascade fashion and their stability guaranteed by Lyapunov criterion. Some simulation results are presented to confirm their effectiveness.

EFFECT OF ANNEALING TEMPERATURE ON DARK CURRENT DENSITY OF SILICON NANOCRYSTALS EMBEDDED IN A NITRIDE MATRIX FOR PHOTOVOLTAIC APPLICATION

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Abstract

The purpose of using high density nanocrystalline silicon embedded in insulator matrices is the energy confinement of Si based quantum dot nanostructures. This approach aims to engineer wide band gap Si materials to be used as upper cell elements in Si based tandem cells in order to increased efficiency and low cost thin film processes. One of the main challenges is to obtain sufficient carrier mobility and hence a reasonably conductivity for photovoltaic application. The results of current density as a function of thermal annealing show the evolution of SiQD formation in Si$_3$N$_4$ matrix. As deposited film fabricated by using dual-mode PECVD has composition of ordered Si rich nitride (Si$_{3+x}$N$_4$) arrays.

Published in: Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology, 2008. ECTI-CON 2008. 5$^{th}$ International Conference on Volume 2, 14-17 May 2008 Page(s):797 - 800 Digital Object Identifier 10.1109/ECTICON.2008.4600551 IEEE CNF
EVALUATION OF VOLTAGE STABILITY INDEX IN ELECTRIC POWER DISTRIBUTION SYSTEMS WITH THREE-PHASE RECTIFIER LOADING

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Abstract

This paper presents an approach to calculate voltage stability index in electric power distribution systems with three-phase rectifier loading. Fast voltage stability index (FVSI) is used as an indicator to evaluate capability of reactive power loading at a given bus position. Three phase rectifier loading is typical in medium voltage industrial plants. Analysis of power transfer through an AC/DC controlled rectifier system is described. From this analysis, FVSI can be computed. To evaluate the FVSI in electric power distribution systems, a 10-bus three-phase test system is employed. As a result, comparing with the index obtained from AC loading case, the voltage stability margin can be enhanced by loading more DC-side powers.

Keywords: Fast voltage stability index, Three-phase rectifier, electric power distribution system, power transfer

Published in: The IASTED International Conference on Modelling, Identification and Control (MIC2008), Innsbruck, Austria, February, 11-13 2008, pp. 19-24
PROBABILISTIC NEURAL NETWORK CLASSIFICATION FOR MODEL -GLUCAN SUSPENSIONS

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Abstract

The problems encountered in brewing commonly attributed to excess -glucan levels include low extract yield, increased lauter runoff times, formation of gelatinous precipitates during aging, and decreased filtration efficiency. Several rheological techniques were used to determine C* or critical concentration where -glucan aggregates begin to entangle and there was a relationship between intrinsic viscosity and C*. This study reports applying Probabilistic Neural Network (PNN) to get new data set of relation between reciprocal of logarithm of relative viscosity 1/log (\(\eta_{rel}\)) and -glucan concentration in seven model buffer systems and thus could be used for C* value determination with better statistical correlation.

Keywords: -Glucan, PNN, Critical concentration, Relative Viscosity, Neural Network

Published in: Proceeding of the 7th WSEAS International Conference on Simulation, Modelling, and Optimization, Sep 15-17, Beijing China.
VERIFICATION SKIP WRITES HEAD-POSITIONING ERROR MECHANISM USING SKIP WRITES PROBLEM DETECTION

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Abstract

HDD-structure interaction is one of the main issues facing the development of the hard disk drive (HDD) system while as they operate at high rotational speeds. Writing instability of HDD has affected related to difficulty in read- write in a HDD. This paper illustrates studying the skip write problem. The effects of head gimbal assemblies (HGA) trouble to writing on media are considered. In addition, studying the variables that affect to writing problem by head gimbal assemblies (HGA) is accomplished. Finally, comparison between experimental data from HDD activity and mathematics analysis of skip write model is also investigated.

Keywords: Hard Disk Drive, HDD, Skip Write Model

Published in: Proceeding of the 8\(^{th}\) WSEAS Conference on ROBOTICS, CONTROL, and MANUFACTURING TECHNOLOGY (ROCOM’08), April 6-8, Hangzhou, China.
GENETIC ALGORITHMS APPROACH TO TWIN-SCREW FOOD EXTRUSION PROCESS
FREQUENCY DOMAIN PARAMETER ESTIMATION

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Abstract

Food extrusion is a shaping operation in which a material is pressurized by some means to force it through a die. To achieve parameters of the twin screw food extrusion process, this paper applies the genetic algorithms for getting those parameters. The genetic algorithms are proficient of finding a global minimum within a specified search interval. The sum of square error on magnitude and phase of the twin screw food extrusion process is minimize and receiving superlative in shape the measured system extracted from the frequency response analysis of the food extrusion process. As established, utilization of the optimization based on Genetic Algorithms gives superior results.

Keywords: Parameter Estimation, Genetic Algorithms, Food, Extrusion Process, Frequency Response

Published in: Proceeding of the 8th WSEAS Conference on APPLIED COMPUTER &APPLIED COMPUTATIONAL SCIENCE (ACACOS’08), April 6-8, Hangzhou, China.
PARAMETER ESTIMATION OF FREQUENCY RESPONSE TWIN-SCREW FOOD EXTRUSION PROCESS
USING GENETIC ALGORITHMS

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Abstract
Autonomic control of food extruders has attracted considerable in recent years. With limited understanding of the complex physio-chemical interactions during the food extrusion process, designing a control system for food extruder is not easy. The common approach is to determine the operating conditions and then to maintain these values as closely as possible using various control loops, if not manual control. This paper applies genetic algorithms to achieve the parameters of the twin-screw food extrusion process. The genetic algorithms are very suitable for searching discrete, noisy, multimodal and complex space. The sum of square error on magnitude and phase of the twin screw food extrusion process is minimize and receiving outstanding in shape the measured system extracted from the frequency response analysis of the food extrusion process. As recognized, exploitation of the optimization based on Genetic Algorithms gives advanced results.

Keywords: Parameter Estimation, Genetic Algorithms, Food, Extrusion Process, Frequency Response

Published in: WSEAS TRANSACTION on SYSTEMS, Issue 7, Volume 7, July 2008. ISSN: 1109 - 2777.
EFFECT OF SPECIMEN CONFIGURATION ON DETERIORATION OF SILICONE RUBBER FOR POLYMER INSULATORS IN SALT FOG AGEING TEST

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Abstract

The paper investigates the effects of specimen configuration on the deterioration of silicone rubber insulators in a salt fog ageing test. A cyclic salt fog ageing test was conducted on three types of high-temperature vulcanized silicone rubber (HTV SiR) specimens: two types of insulators having sheds, and plain rods without sheds. The test was based fundamentally on the CIGRE WG 15-04 specifications. After 50 test cycles, the three types of specimens showed different degrees of surface deterioration. Erosion on the straight shed insulator was more severe than that on the alternate shed insulator even though the two had the same leakage distance. No erosion was observed on the rod-type specimens, which had shorter leakage distances than the insulator-type specimens.

Keyword: specimen configuration, deterioration, silicone rubber, polymer insulator, salt fog ageing test, high-temperature vulcanized silicone rubber, erosion, straight shed insulator, alternate shed insulator, plain rod.

Published in: IEEE Transactions on Dielectrics and Electrical Insulation, Volume 13, Issue 1, February 2006, pp. 129 – 138.
DYNAMIC MODEL IDENTIFICATION OF INDUCTION MOTORS USING INTELLIGENT 
SEARCH TECHNIQUES WITH TAKING CORE LOSS INTO ACCOUNT

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Abstract

Traditionally, dynamic parameters of induction motors can be roughly estimated through conventional 
tests (no load test, block rotor test and retardation test) and core loss is neglected in the dynamic behaviors 
analysis. Due to the complication of dynamic behaviors of induction motors, inaccuracy of transient 
characteristics may obtain when using these dynamic parameters. In order to improving accuracy of dynamic 
behavior analysis, however, the inclusion of core loss in the machine model needs to be re-addressed and an 
intelligent approach to estimated dynamic parameters needs to be adopted. In this paper, three of intelligent search 
techniques, which are i) Tabu Search (TS), ii) Adaptive Tabu Search (ATS) and iii) Genetic Algorithm (GA), are 
employed to demonstrate the effectiveness of intelligent identification compared with the conventional model 
with and without core loss parameter(RC). The simulation results from dynamic parameters including RC 
obtained by the GA in comparison with the experimental results are convinced the effectiveness for this aim.

Keywords: Induction Motor, Dynamic Model, Intelligent Search, Core Loss, Tabu Search, Adaptive Tabu 
Search, Genetic Algorithm.

COMPARISON OF LEAKAGE CURRENT AND AGING OF SILICONE RUBBERS AND PORCELAIN IN BOTH FIELD AND SALT-FOG TESTS

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Abstract
Silicone rubbers and porcelain intended for outdoor insulation were tested under electric fields at ac 60 V/mm on average for about two years at the field test site at Chubu University. Leakage currents on all materials were characterized and separated into three categories: sinusoidal, local arc, and their transition components. The porcelain allowed a larger leakage current than the silicone rubber samples, for which the cumulative charge of ca. 160 C was recorded in about two years. The cumulative charge of the silicone rubbers was less than 12 C; the cumulative charge of the local arc component, which was likely to be related to surface damage, was less than 3 C. Gas chromatography – mass spectroscopy indicated that the chemical structure change at the silicone rubber surface layer closely resembled that of de-energized surfaces. The dominant aging factor of the silicone rubber in this field test was not electrical stress, but weathering stress such as that resulting from UV radiation. We also performed salt-fog tests of which conditions were adjusted by incorporating non-soluble deposits (kaolin powder) and by changing the salt-fog input duration. The ranking in the salt fog test was opposite that of the field test. The salt-fog test emphasized the superiority of SIRs to porcelain when compared with the field test. The difference between artificial salt-fog and natural rainfall probably caused such differences.

Keyword: Polymer insulator, ceramic insulator, silicone rubber, porcelain, outdoor insulation, contamination, leakage current, aging, hydrophobicity.

Published in: IEEE Transactions on Dielectrics and Electrical Insulation, Volume 13, Issue 6, December 2006, pp.:1286 - 1302.
MULTI-OBJECTIVE OPTIMAL PRICING DISPATCH USING PARTICLE SWARM OPTIMIZATION TECHNIQUE

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Abstract:
In this paper, electricity rate structures is receiving a great deal, a strategy for pricing electricity supply is evaluated. The modeling scheme is applied to the IEEE standard 5, 14 and 30 power system and involves solving a modified optimal power flow problem iteratively using particles swarm optimizer. In addition, the effectiveness of the proposed approach and its potential to solve the multi-objective electricity supply pricing dispatch problem are confirmed.

Keywords: Electricity rate structure, optimal power flow, multi-objective, particles swarm optimization.

FUZZY ARTMAP TECHNIQUE FOR SPEECH NOISE REDUCTION

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Abstract

This paper presents an approach to reduction noise of speech voice commanded automatic wheel chair using a technique based on the fuzzy ARTMAP neural network (FAMNN). The measurable output noisy speech with 5dB, 1dB, -1dB, -5dB and -10dB SNR level is obtained as the contaminated signal of the interference to compare with the output data of the filter. The white noise source is acquired as the input. Finally, after training, the fuzzy ARTMAP output (i.e. estimated interference) was demonstrated. Then the estimated information signal is calculated as the difference between the measured signal and the estimated interference. The fuzzy ARTMAP could do a practically superior situation in adaptive de-noising of a speech voice commanded automatic wheel chair system with nonlinear characteristics.

Keywords: FAMNN, fuzzy ARTMAP neural network, noise, noise reduction, speech.

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OPTIMAL PID TUNING FOR AGC SYSTEM USING ADAPTIVE TABU SEARCH

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Abstract:
This paper presents an application of the intelligent search technique for the parameters optimization of conventional automatic generation control (AGC) systems. An efficient intelligent search technique, which is Adaptive Tabu Search (ATS), is employed to demonstrate the effectiveness of the intelligent search techniques in the tuning of the AGC parameters. A two-area non-reheat thermal system is considered to be equipped with PID controllers to depict the optimum parameter search. Parameters of these PID controllers are obtained using Adaptive Tabu Search technique. The same parameters are also turned using the Ziegler-Nichols method. The performance of the proposed controller has been evaluated with the performance of the conventional integral controller and the conventional Ziegler-Nichols PID tuning controller in order to demonstrate the superior efficiency of the proposed ATS based PID controller. By comparison with the conventional technique, the effectiveness of the anticipated scheme is confirmed.

Keywords: Automatic generation control, intelligent search technique, PID tuning, Adaptive Tabu Search, Optimization, Power systems

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STABILITY ENHANCEMENT FOR MULTI-MACHINE POWER SYSTEM BY OPTIMAL PID TUNING OF POWER SYSTEM STABILIZER USING PARTICLE SWARM OPTIMIZATION

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Abstract

This paper demonstrates the superior effectiveness of utilizing the artificial search technique to ascertain parameters optimization of power system stabilizer (PSS), contemplating proportional-integral-derivative controller (PID) for a multi-machine power system, compared to the customary Ziegler-Nichols method. As the PID - PSS parameters are also tuned by the Ziegler-Nichols method at the same operating point. Its effectiveness is presented using four machines power system. Acquire settings of PID - PSS which meliorate damping frequency of system are optimized by minimizing an objective function using Particle Swarm Optimization, an artificial search technique. The results convey eminent efficiency of the proposed PSO based PID controller.

Keywords: Power system stabilizer, PID tuning, Multi-machine power system, Particle Swarm Optimization, Artificial intelligent search technique

OPTIMAL PID TUNING FOR POWER SYSTEM STABILIZERS USING ADAPTIVE PARTICLE SWARM OPTIMIZATION TECHNIQUE

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Abstract
An application of the intelligent search technique to find optimal parameters of power system stabilizer (PSS) considering proportional-integral-derivative controller (PID) for a single-machine infinite-bus system is presented. Also, an efficient intelligent search technique, adaptive particle swarm optimization (APSO), is engaged to express usefulness of the intelligent search techniques in tuning of the PID-PSS parameters. Improve damping frequency of system is optimized by minimizing an objective function with adaptive particle swarm optimization. At the same operating point, the PID-PSS parameters are also tuned by the Ziegler-Nichols method. The performance of proposed controller compared to the conventional Ziegler-Nichols PID tuning controller. The results reveal superior effectiveness of the proposed APSO based PID controller.

Keywords: closed loop systems, optimization, electric power generation, artificial intelligence, microcontrollers, system buses, mathematics computing

SOLVING THE UNIT COMMITMENT PROBLEM USING AN ADAPTIVE IMMUNE GENETIC ALGORITHM

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Abstract

This paper presents an Adaptive Immune Genetic Algorithm (AIGA) solution to solve the Unit Commitment (UC) problem. The unit commitment problem formulation takes into consideration the minimum up and down time constraints, start up cost and spinning reserve, which is defined as the minimization of the total objective function while satisfying all the associated constraints. Mathematical formulation, illustration and production results for a 10 generator-scheduling problem are presented. Finally, numerical results of systems are established the effectiveness of purpose technique.

Keywords: genetic algorithms, artificial intelligence, formal logic, optimization, mathematics computing.

PARTIAL DISCHARGES LOCALIZATION IN OIL INSULATING TRANSFORMER USING ADAPTIVE TABU SEARCH

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Abstract

Power transformer is very important apparatus in electrical power system network. Partial discharges in a power transformer are often a predecessor of a serious fault. For this reason, partial discharge measurements are an important diagnostic tool to monitor the insulation condition of a power transformer. The simple Partial Discharges (PD) detection is not enough to take a decision about intervening, so the localization is necessary to assess the risk and to plan corrective actions. This paper presents a solution for PD source localization in oil insulating power transformers using Adaptive Tabu Search (ATS). The parameters extracted from the acoustic signals collected by piezoelectric sensors installed outside of the transformer, provide the correct position of PD. The conclusion describes the effectiveness of the proposed solution.

Keywords: Partial Discharge, Localization, Oil Insulating Transformer, Acoustic Signal, Adaptive Tabu Search.

OPTIMAL PID TUNING OF POWER SYSTEM STABILIZER FOR MULTI-MACHINE POWER SYSTEM USING PARTICLE SWARM OPTIMIZATION

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Abstract:
This paper presents an application of the artificial intelligent search technique to find parameters optimization of power system stabilizer (PSS) considering proportional-integral-derivative controller (PID) for a multi-machine power system. Gain settings of PID - PSS which improve damping frequency of system are optimized by minimizing an objective function using the artificial intelligent search technique, Particle Swarm Optimization (PSO). Four machines power system is used to reveal the effectiveness of purpose method. At the same operating point, the PID - PSS parameters are also tuned by the Ziegler-Nichols method. The performance of proposed controller compared to the conventional Ziegler-Nichols PID tuning controller. The results reveal superior effectiveness of the proposed PSO based PID controller.

Keywords: Power system stabilizer, PID tuning, multi-machine power system, Particle Swarm Optimization, Artificial intelligent search technique.

ELECTRIC FIELD AND POTENTIAL DISTRIBUTIONS ALONG SURFACE OF SILICONE RUBBER POLYMER INSULATORS USING FINITE ELEMENT METHOD

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Abstract

This paper presents the simulation the results of electric field and potential distributions along surface of silicone rubber polymer insulators. Near the same leakage distance subjected to 15 kV in 50 cycle salt fog ageing test, alternate sheds silicone rubber polymer insulator showed better contamination performance than straight sheds silicone rubber polymer insulator. Severe surface ageing was observed on the straight sheds insulator. The objective of this work is to elucidate that electric field distribution along straight sheds insulator higher than alternate shed insulator in salt fog ageing test. Finite element method (FEM) is adopted for this work. The simulation results confirmed the experimental data, as well.

Keywords: Electric field distribution, potential distribution, silicone rubber polymer insulator, finite element method.

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STUDY OF TOWER GROUNDING RESISTANCE EFFECTED BACK FLASHOVER TO 500 KV TRANSMISSION LINE IN THAILAND BY USING ATP/EMTP

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Abstract
This study describes analysis of tower grounding resistance effected the back flashover voltage across insulator string in a transmission system. This paper studies the 500 kV transmission lines from Mae Moh, Lampang to Nong Chok, Bangkok, Thailand, which is double circuit in the same steel tower with two overhead ground wires. The factor of this study includes magnitude of lightning stroke, and front time of lightning stroke. Steel tower uses multistory tower model. The assumption of studies based on the return stroke current ranged 1-200 kA, front time of lightning stroke between 1 \( \mu \text{s} \) to 3 \( \mu \text{s} \). The simulations study the effect of varying tower grounding resistance that affect the lightning current. Simulation results are analyzed lightning over voltage that causes back flashover at insulator strings. This study helps to know causes of problems of back flashover the transmission line system, and also be as a guideline solving the problem for 500 kV transmission line systems, as well.

Keywords: Tower grounding resistance, back flashover, multistory tower model, lightning stroke current.

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SIMULATION OF ELECTRIC FIELD AND POTENTIAL DISTRIBUTIONS ON SILICONE RUBBER POLYMER INSULATORS UNDER CONTAMINATION CONDITIONS USING FINITE ELEMENT METHOD

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Abstract
This paper presents the simulation results of electric field and potential distributions along surface of silicone rubber polymer insulators under clean and contamination conditions. In former experimental research, silicone rubber polymer insulators having near the same leakage distance are subjected to 15 kV during 50 test cycles of artificial salt fog ageing test. After 50 test cycles, alternate sheds silicone rubber polymer insulator showed better contamination performance than straight sheds silicone rubber polymer insulator. Severe surface ageing was observed on the straight sheds insulator. The objective of this work is to elucidate that electric field distribution along straight sheds insulator higher than alternate shed insulator in salt fog ageing test. Finite element method (FEM) is adopted for this work. The simulation results confirmed the experimental data, as well.

Keywords: Electric field distribution, potential distribution, silicone rubber polymer insulator, straight sheds, alternate shed, clean condition, contamination condition, finite element method

APPLICATION OF ARTIFICIAL INTELLIGENT TECHNIQUE FOR PARTIAL DISCHARGES LOCALIZATION IN OIL INSULATING TRANSFORMER

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Abstract

Partial discharges in a power transformer are often a predecessor of serious fault, as Power transformers are fundamental apparatuses in electrical power system network. Thus, partial discharge measurement are a significant diagnostic tool to supervise the insulation state of a power transformer, as elementary Partial Discharges (PD) detection is not adequate to make a decision about intervening, so the localization is required to evaluate the risk and to plan rectification actions. Acoustic signals collected by piezoelectric sensors established outside of the transformer, supply the accurate position of PD as parameters. Conclusion demonstrates the efficacious of suggested solution for PD source localization in oil insulating power transformers using Adaptive Tabu Search (ATS).

Keywords: Artificial Intelligent Technique, Partial Discharge, Localization, Oil Insulating Transformer, Acoustic Signal, Adaptive Tabu Search

HYBRID ARTIFICIAL INTELLIGENCE APPROACH FOR GRAPE LEAF DISEASE DIAGNOSIS SYSTEM FROM COLOR IMAGERY

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Abstract

Plant disease is one of crucial causes that substantially decreases quantity and degrades quality of products. By minimizing plant disease in earlier stage of plant life cycle allows tremendous improvement of the product quality. There is, however, a fair amount of expertise in various fields of disciplines in order to accomplish such plant disease control. This work presents automatic leaf disease diagnosis system from color imagery using hybrid artificial intelligence techniques. Grape leaf diseases are chosen to be investigated by the proposed system. The entire framework of grape leaf disease diagnosis system is discussed which is mainly composed of three subsystems: (i) grape leaf color segmentation, (ii) grape leaf disease color segmentation, and (iii) grape leaf disease classification. Self-organizing feature map and back propagation neural networks are deployed for grape leaf color segmentation mechanisms. Modified self-organizing map with optimal parameters is also applied in grape leaf disease color segmentation mechanisms. The network parameters are optimized by both genetic algorithm and particle swarm optimization for comparisons. Support vector machines are the main engine for both grape leaf disease color segmentation and grape leaf disease classification. For classification mechanisms, Gabor wavelet is used to extract both characteristic and color features of grape leaf diseases. There are two types of grape leaf disease that are examined: rust disease and scab disease. The system is able to extract grape leaf disease pixels from color images which can contain multiple leaves with different sizes, shapes, and orientations. Moreover, the system can reliably perform diagnosis of grape leaf images from various types of camera with different brightness and color characteristics. The proposed system shows desirable results which can be further developed for any agricultural product analysis/inspection system.

Keyword: grape leaf disease diagnosis, self-organizing feature map, genetic algorithm, particle swarm optimization, back-propagation neural network, support vector machines, Gabor wavelet filters

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COMPARATIVE PERFORMANCE OF MULTIWAVELET-BASED
IMAGE WATERMARKING SCHEMES

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Abstract

This paper presents the performance comparisons of the two image watermarking schemes in the multiwavelet transform domain. The first one is based on the concept of the watermarking technique that has been designed in the previous chapter and the second one is based on the code division multiple access (CDMA) technique. The embedding information is a visually recognizable pattern which can be extractable not just detectable to characterize the owner. Both techniques do not require the original image in the watermark extraction process. The normalized correlation and bit error rate are used to evaluate the robustness of the watermark and the evaluation process of robustness is performed on the watermarked images from both techniques under the same image quality. The attacks include JPEG compression, JPEG2000 compression, lowpass filtering and a series of selected attacks from StirMark benchmark.

Keywords: image watermarking, multiwavelet, multiwavelet tree, and code division multiple access

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pp. 1041-1047
Abstract

Robot head is one of the most important parts for active vision system. Pan-tilt-vergence (PTV) form is the most widely used in such system. This 4 degree-of-freedom head provides the advantage of capability to track the moving objects efficiently. An overall tracking performance of the system depends on its controller, as well as a physical design of the head. This work presents a development of controlling PTV head to achieve one of human-like eye movement behaviors, i.e. saccade. Visual feedback is deployed to aid a controller for directly driving the PTV head. The dynamic Jacobian estimation is obtained by using a self-organizing map (SOM) network with unsupervised teaming scheme. The estimated Jacobian is then used to achieve the adaptive control of the PTV head controller. The experimental results are desirable for both performance and speed of teaming. Moreover, the system can eventually perform tracking without a priori knowledge of the head structure, e.g. mathematical model of the head and hardware calibration. Hence, the system can conveniently be implemented.

Keywords: Jacobian estimation, self-organizing map, active vision system, saccade, pan-tilt-vergence, tracking moving object.

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A NEW APPROACH FOR OPTIMIZATION IN IMAGE WATERMARKING BY USING GENETIC ALGORITHMS

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Abstract

In this paper, the authors propose the spread spectrum image watermarking algorithm using the discrete multiwavelet transform. Performance improvement with respect to existing algorithms is obtained by genetic algorithms optimization. In the proposed optimization process, the authors search for parameters that consist of threshold values and the embedding strength to improve the visual quality of watermarked images and the robustness of the watermark. These parameters are varied to find the most suitable for images with different characteristics. The experimental results show that the proposed algorithm yields watermark that is invisible to human eyes and robust to various image manipulations. The authors also compare their experimental results with the results of previous work using various test images.

Index Terms-Genetic algorithms, image watermarking, multi-Navelet, wavelet.