

Analytical closed-form solution of three-phase four-switch PWM rectifier

JIŘÍ ŠKRAMLÍK, VIKTOR VALOUCH, JIŘÍ KLÍMA, IVO PECHA

Abstract. A mathematical model of a three-phase four-switch pulse-width modulation rectifier is proposed. A mixed p - z approach based on integral transformations (the Laplace transform and modified Z -transform) is used for obtaining solution in a closed form. The analytical procedure is verified by experimental results.

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Three-dimensional MHD free-convection flow past an infinite vertical porous plate with periodic suction and gravity modulation

BALJINDER S. SAINI, SATISH C. RAJVANSHI

Abstract. The effect of periodic oscillation of the gravitational field on free-convection from a vertical plate is investigated. It is assumed that the gravity modulation is given by a harmonic function superimposed to a constant. The effect of gravity modulation on velocity profiles and temperature profiles are discussed. The transformed equations are solved by perturbation technique to investigate the effects of Prandtl number and gravity modulation parameter. It is shown that these parameters affect considerably the shear stress and the rate of heat transfer.

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Fuzzy vector control of asynchronous motor

JAROSLAVA ŽILKOVÁ, JAROSLAV TIMKO, MICHAL KOVÁČ

Abstract. The design and simulation of a fuzzy logic based controller used for vector controlled three-phase squirrel-cage asynchronous motor is performed. The performance of the proposed fuzzy controller is investigated and compared with results obtained from a conventional state controller. The obtained results demonstrate that the performance of the fuzzy controller is better than the performance of the state controller.

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Analytical method of calculation of torque ripple of a universal motor supplied by an IGBT chopper

PAVEL ZÁSKALICKÝ, MÁRIA ZÁSKALICKÁ

Abstract. An analytical method for computing the torque ripple and current waveforms of a dc-series universal motor supplied by an IGBT chopper is presented. The chopper output voltage waveform is formulated in terms of the Fourier series. The armature reaction of the motor is included in the model. The motor performance is computed using the circuit parameters determined by measurements. Comparison of the calculated and measured current waveforms confirms that the method is reliable.

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Solving inverse problem in electrical impedance tomography by using multilevel sets idea

TOMASZ RYMARCZYK, STEFAN F. FILIPOWICZ, JAN SIKORA

Abstract. An application of the level set function is presented for identification of the unknown shape of an interface motivated by the Electrical Impedance Tomography (EIT). The Mumford–Shah method is proposed in the form of an iterative algorithm. A new approach is adopted based on a continuous approximation of material coefficient distribution using a modified level set methods and finite element method. A model problem in EIT for identification of unknown shapes from data in a narrow strip along the boundary of the domain is investigated.

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On discretization of strongly non-linear systems

DAVID PÁNEK, JOSEF HRUŠÁK, PETR KROPÍK, PETR POLCAR

Abstract. A method of discretization of strongly non-linear systems is proposed. The method is based on application of dissipation normal forms (discrete and continuous). It is shown that it is possible to conserve chaotic system behaviour of the system during discretization, even when this behaviour is usually considered as critically sensitive to changes in initial values, parameters and inputs.

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Thermal effect on vibration of orthotropic rectangular plate with parabolic thickness variations

ARUN K. GUPTA, SUBODH KUMAR

Abstract. Thermal gradient effect on vibration of a rectangular plate having bi-directional variation thickness is discussed. The plate is assumed to be orthotropic in nature. Thickness of the plate is assumed to be varying parabolically in both directions. The results can be helpful for designing many scientific constructions, where homogeneous structures are exposed to thermal gradient and their material properties undergo significant changes.

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