OPTIMAL SWITCHING ANGLES OF A SWITCHED RELUCTANCE MOTOR

Želmíra Ferková, Ladislav Zboray

Abstract. Torque and efficiency of a switched reluctance motor (SRM) may be influenced by suitable choice of switch on/off angles. The optimal pair of switching angles could be found by genetic algorithm. The considered criterions either minimize torque ripple or ensure minimal Joule losses at given values of torque and speed. The calculated results were verified by a SRM mathematical model and presented in graphical form.

Back to CONTENTS

DYNAMIC ANALYSIS OF ELECTRICAL SHAFT FED FROM PWM VOLTAGE SOURCE

Sid-Ali Fellag, Ahcene Boukadoum, Akila Boukhelifa

Abstract. A complete mathematical model of electrical shaft fed from PWM voltage source is presented. The model also respects the common resistance and common capacitor. Attention is paid mainly to its behavior in different situations with different loads. The influence of the PWM converter is also investigated.

Back to CONTENTS

COMPARISON OF THE SYSTEM CONTROL IN STATE SPACE WITH THE USAGE OF DIFFERENT OBSERVERS

Andrej Sarjaš, Amor Chowdhury, Rajko Svečko

Abstract. Various modes of control with various state observers, applicable when not all state variables can be measured, are presented. Correction feedback gain of linear state observer is determined on two different main modes of calculation; with shifting poles technique and optimization of error covariance matrix—Kalman filter. For each example of the observer an analytical calculation, a presentation of the results of control on a real object (balance control system and DC servo drive) and a comparison of the results are provided.

Back to CONTENTS

NUMERICAL MODELLING OF MAGNETIC FIELD DEFORMATION OWING TO SUSCEPTIBILITY IN SAMPLES MEASURED USING THE MAGNETIC RESONANCE SYSTEM

Karel Bartušek, Eva Kroutilová,
Pavel Fiala, Miloslav Steinbauer

Abstract. The possibility is studied of numerical modelling of magnetic field deformations in the environment of measured diamagnetic and paramagnetic samples for the purposes of studying magnetic resonance (MR) image deformations owing to the susceptibility of heterogeneous materials (objects). The verification is realized using a simple sample configuration (circular plate), and the numerically modelled cross-sections are compared with the experimentally obtained values of the magnetic field measured by the MR gradient echo technology. The results show that it is possible—via a technical calculation—to determine a magnetic field deformation in the environment of complex-shaped or inhomogeneous structures in the MR experiments.

Back to CONTENTS

ANALYTICAL METHOD OF CALCULATION OF THE CURRENT AND TORQUE OF A RELUCTANCE STEPPER MOTOR USING FOURIER COMPLEX SERIES

Pavel Záskalický, Mária Záskalická

Abstract. An analytical method for calculating the phase current and electromagnetic torque of the motor via complex Fourier series is proposed. Saturation effect of the machine is neglected. Speed of the motor is considered to be constant.

Back to CONTENTS

PHYSICAL ASPECTS OF DIAPHRAGM DISCHARGE CREATION USING CONSTANT DC HIGH VOLTAGE IN ELECTROLYTE SOLUTION

Zdenka Stará, František Krčma, Jana Procházková

Abstract. New results were obtained from the investigation of the breakdown moment of diaphragm discharge generated using constant DC voltage in water solutions of two electrolytes (NaCl and $NaNO_3$). Electrical discharge was created in an orifice (initial diameter of 0.2 mm) in dielectric diaphragm (thickness of 0.25 mm) separating two electrode spaces. Both dynamic and static VA characteristics were recorded and, subsequently, breakdown parameters were determined as a function of solution conductivity (adjusted by electrolyte concentration in the range of 300–1300 $\mu S\,cm^{-1}$). Obtained results revealed a significant decrease of breakdown voltage (from 1350 to 880 V) and resistance with the increasing solution conductivity. On the other hand, discharge power and current at breakdown moment was enhanced by the increasing conductivity (from 40 to 100 mA). This effect was similar in both tested electrolytes. Discharge ignition in water was related with bubble creation in the orifice, according to the thermal theory of electrical discharge generation. This phenomenon was confirmed by records of high speed camera and sound diagnostics.

Back to CONTENTS

TEST OF POTENTIAL INTERTURN FAULTS OF COMPASS-D TOROIDAL FIELD COILS

František Žáček, Jaromír Zajac, Ladislav Kryška, Josef Havlíček

Abstract. A test of toroidal field (TF) coils of tokamak COMPASS-D is described. The test was targeted at the finding of potential interturn faults and especially the comparison of the condition of TF coils before and after transport of the device from Culham Laboratory, the United Kingdom Atomic Energy Authority, to the Institute of Plasma Physics, AS CR, v.v.i, Prague.

Back to CONTENTS

NUMERICAL SOLUTION OF PHASE CHANGE MATERIALS FOR THERMAL MANAGEMENT OF INTEGRATED CIRCUIT PACKAGES

Pavel Fiala, Miloslav Steinbauer, Ivo Běhunek

Abstract. An analytical description and solution of heat transfer, melting and freezing process in 1D applied to inorganic crystalline salts is presented. Numerical analysis of a real 3D model is also carried out. Some of the 3D results obtained by means of the finite element method were verified experimentally in the laboratory.

Back to CONTENTS