What Stator Current Processing Based Technique To Use for Induction Motor Rotor Faults Diagnosis

Benbouzid, M.E.H.; Kliman, G.B.

Author Affiliation: University of Picardie; General Electric Co.

Abstract: In recent years, marked improvement has been achieved in the design and manufacture of stator winding. However, motors driven by solid-state inverters undergo severe voltage stresses due to rapid switch-on and switch-off of semiconductor switches. Also, induction motors are required to operate in highly corrosive and dusty environments. Requirements such as these have spurred the development of vastly improved insulation material and treatment processes. But cage rotor design has undergone little change. As a result, rotor failures now account for a larger percentage of total induction motor failures. Broken cage bars and bearing deterioration are now the main cause of rotor failures. Moreover, with advances in digital technology over the last years, adequate data processing capability is now available on cost-effective hardware platforms to monitor motors for a variety of abnormalities on a real-time basis in addition to the normal motor protection functions. Such multifunction monitors are starting to displace the multiplicity of electromechanical devices commonly applied for many years. For such reasons, this paper is devoted to a comparison of signal-processing-based techniques for the detection of broken bars and bearing deterioration in induction motors. Features of these techniques that are relevant to fault detection are presented. These features are then analyzed and compared to deduce the most appropriate technique for induction motor rotor fault detection.

Keywords: Induction motor, rotor fault diagnosis, stator current.

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Energy Development and Power Generation

Energy Yield Simulations of Interconnected Solar PV Arrays

Kaushika, N.D.; Gautam, N.K.

Author Affiliation: Indian Institute of Technology.

Abstract: The electrical characteristics of array interconnection schemes are investigated, using simulation models to find a configuration that is comparatively less susceptible to shadow problems and power degradation resulting from the aging of solar cells. Three configurations have been selected for comparison: simple series-parallel (SP) array, which has zero interconnection redundancy; total-cross-tied (TCT) array, which is obtained from the simple SP array by connecting ties across each row of junctions and which may be characterized as the scheme with the highest possible redundancy; and bridge-linked (BL) array, in which all cells are interconnected in bridge rectifier fashion. The explicit computer simulations for the energy yield and current-voltage distributions in the array are presented, which seem to favor cross-tied configurations (TCT and BL) in coping with the effects of mismatch losses.

Keywords: Solar PV array, cross-tied array, solar interconnection schemes, energy yield, shadow problem.

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Optimal Design of Power System Stabilizers Using Evolutionary Programming

Abido, M.A.; Abdel-Magid, Y.L.

Author Affiliation: King Fahd University of Petroleum and Minerals.

Abstract: The optimal design of power system stabilizers (PSS) using the evolutionary programming (EP) optimization technique is presented. The proposed approach employs EP to search for optimal settings of PSS parameters that shift the system eigenvalues associated with the electromechanical modes to the left in the s-plane. Incorporation of the EP algorithm in the design of PSSs significantly reduces the computational burden. The performance of the proposed PSSs under different disturbances, loading conditions, and system configurations is investigated for a multimachine power systems. The eigenvalue analysis and the nonlinear simulation results show the effectiveness and robustness of the proposed PSSs to damp out the local as well as the interarea modes of oscillations and work effectively over a wide range of loading conditions and system configurations.

Keywords: PSS design, evolutionary programming, and dynamic stability.

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Theoretical and Experimental Analyses of Photovoltaic Systems with Voltage and Current-Based Maximum Power Point Tracking

Masoum, M.A.; Dehbonei, H.; Fuchs, E.F.

Author Affiliation: Iran University of Science & Technology; Curtin University of Technology; University of Colorado.

Abstract: Detailed theoretical and experimental analyses are presented for the comparison of two simple fast and reliable maximum power point tracking (MPPT) techniques for photovoltaic systems (PV): the voltage-based (VMPPT) and the current-based (CMPPT) approaches. A microprocessor-controlled tracker capable of online voltage and current measurements and programmed with both VMPPT and CMPPT algorithms is constructed. The load of the solar system is either a water pump or a resistance. Simulink facilities are used for simulation and modeling of the novel trackers. The main advantage of this new MPPT, as compared with present trackers, is the elimination of reference (dummy) cells, which results in a more efficient, less expensive, and more reliable PV system.

Keywords: Photovoltaic, maximum power, tracker, pump.

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Coal Mill Modeling by Machine Learning Based on On-Site Measurements

Zhang, Y.G.; Wu, Q.H.; Wang, J.; Oluwande, G.; Matts, D.; Zhou, X.X.

Author Affiliation: Electric Power Research Institute; University of Liverpool; National Power PLC.

Abstract: This paper presents a novel coal mill modeling technique using genetic algorithms (GA) based on routine operation data measured on-site at a National Power (NP) power station, in England, U.K. The work focuses on the modeling of an E-type vertical spindle coal mill. The model performances for two different mills are evaluated, covering a whole range of operating conditions. The simulation results show a satisfactory agreement between the model responses and measured data. The appropriate data can be obtained without recourse to extensive mill tests and the model can be constructed without difficulty in computation. Thus the work is of general applicability.

Keywords: Coal mill, control system, genetic algorithms, system modeling.

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Municipal Solid Waste Fueled Power Generation for India

Palanichamy, C.; Babu, N.S.; Nadarajan, C.

Author Affiliation: Sultan Saiful Rijal Technical College; Drexel University; Magnum Power.

Abstract: The energy policy of the government of India aims at ensuring adequate energy suppiles at a minimum cost, achieving