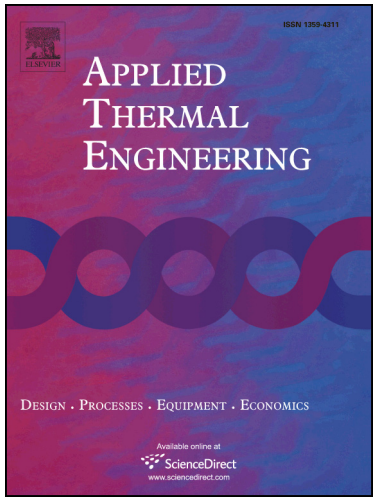

Research Paper

A Steam Turbine Dynamic Model for Full Scope Power Plant Simulators

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A Steam Turbine Dynamic Model for Full Scope Power Plant Simulators

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Abstract

The development of a steam turbine dynamic model for full scope power plant simulators is described in this work. Model completeness is one of the main features of the model developed as it attempts to completely cover the operating envelope of steam turbines. For modelling purposes, distinct regions within the safe operating envelope of steam turbines are discriminated. Accordingly, the corresponding model formulation associated with each of the steam turbine-related operation modes accounted for is detailed. A particular emphasis is put on thermal and rotational inertia effects that are important during start up and shut down of steam turbines. The developed steam turbine dynamic model is utilized for simulating a 300 MW class steam turbine belonging to an existing combined cycle power plant. Comparisons between results obtained from such simulations and those characterizing the equipment actual operation are discussed. The agreement between model results and operating data is in general good, as in average the corresponding discrepancies are of the order of 2% or less. The outcomes from this work suggest that producing high fidelity results from steam turbine dynamic models requires accounting for a number of physical phenomena, primarily, those related to heat transfer processes.

Keywords: Power plants, Steam turbines, Dynamic modelling, Full scope simulators

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