

Frequency-dependent model for transient stability analysis

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Abstract-

This letter proposes a precise frequency-dependent model for power systems that takes into account spatial variations of the frequency in the network during a transient. In the proposed approach, boundary conditions are synchronous machine rotor speeds and the variation of the frequency is based on the concept of frequency divider recently proposed by the authors. The proposed model leads to a more accurate simulation of transient conditions than conventional models for angle and voltage stability analysis. This letter discusses the theoretical background of the proposed model and compares it with the standard transient stability model, as well as with a fully-fledged dynamic phasor model through a 1479-bus dynamic model of the all-island Irish transmission system.

Index Terms- Frequency dependent models, transient stability analysis, center of inertia, frequency divider.

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