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A Joint Possibilistic-Probabilistic Tool for Load Flow Uncertainty Assessment-Part II: Case Studies

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Abstract : Power systems are innately uncertain systems. To face with such uncertain systems, robust uncertainty assessment tools are appealed. This paper inspects the uncertainty assessment formulation of the load flow (LF) problem considering different kinds of uncertainties, developed in its companion paper through some case studies. The proposed methodology is based on the evidence theory and joint propagation of possibilistic and probabilistic uncertainties. The load and wind power generation are considered as probabilistic uncertain variables and the electric vehicles (EVs) and gas turbine distributed generation (DG) units are considered as possibilistic uncertain variables. The cumulative distribution function (CDF) of the system output parameters obtained by the pure probabilistic method lies within the belief and plausibility functions obtained by the joint propagation approach. Furthermore, the imprecision in the DG parameters is explicitly reflected by the gap between the belief and plausibility functions. This gap, due to the epistemic uncertainty on the DG resources parameters grows as the penetration level increases.

Keywords : electric vehicles, joint possibilistic- probabilistic uncertainty modeling, uncertain load flow, wind turbine generator
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