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A Genetic-Neural-Network Modeling Approach for Self-Heating in GaN High Electron Mobility Transistors

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Abstract : In this paper, a genetic-neural-network (GNN) based large-signal model for GaN HEMTs is presented along with its parameters extraction procedure. The model is easy to construct and implement in CAD software and requires only DC and S-parameter measurements. An improved decomposition technique is used to model self-heating effect. Two GNN models are constructed to simulate isothermal drain current and power dissipation, respectively. The two model are then composed to simulate the drain current. The modeling procedure was applied to a packaged GaN-on-Si HEMT and the developed model is validated by comparing its large-signal simulation with measured data. A very good agreement between the simulation and measurement is obtained.

Keywords : GaN HEMT, computer-aided design and modeling, neural networks, genetic optimization
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