Streamlining Characterization and Modelling of GaN HEMTs for Pulsed-Power Applications

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Gallium-nitride-based high electron mobility transistors (HEMT) are an emergent class of electronic components which, owing to their typical output voltages in hundreds of volts and rise time down to nanoseconds, can be used as fast switching elements in pulsed-power circuits. With the improvements of the GaN HEMT technology, there is a constant need to characterize new devices and create predictive behavioral models. Building upon the existing methods of MESFET and HEMT modelling, an algorithm for GaN HEMT simulation was adapted to extract and reproduce the device's behavior in a wide range of operating points relevant to its subsequent usage as a pulsed-power switch, taking into account effects, such as self-heating, which significantly affect the function of transistors. The proposed algorithm attempts to reduce the number of measurements necessary to extract the crucial model parameters while retaining the model's functionality.

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