Abstracts

Table-based dynamic FET model assembled from small-signal models

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A data-table-based large-signal metal-semiconductor field-effect transistor model is presented based on an ensemble of bias-dependent small-signal equivalent circuits. The model is capable of accurate simulation of small-signal S-parameters as well as large-signal performance over the data-acquisition bias range. In addition to the dc current sources, the model contains two quasi-static charge sources and a dynamic radio frequency (RF) current source, which depends on the temperature rise. By introducing the dynamic RF current source, the problem of path dependence, which occurs in modeling large-size devices and devices with dispersion, is resolved. All equivalent elements are obtained by cubic spline interpolation. Extrapolation of the model beyond the measurement range is taken into account. The model is extracted by an in-house software without involving optimization. The validity of the model is demonstrated by comparing the simulation of small-signal S-parameters over a wide bias range, as well as power, linearity, and waveform characteristics to the measured data.

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