Modelling of high-frequency inductance with Qucs non-linear radio frequency equation defined devices

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Abstract

This article introduces a non-linear algebraic radio frequency equation defined device (RFEDD) formed from two-port and multi-port networks. The properties of the new device are described and its use in modelling high-frequency coil impedance, Q factor, phase and noise is demonstrated. A later section of the article shows how non-linear RFEDDs can be merged with Verilog-A compact macromodels to overcome some of the current AC domain limitations in the Verilog-A hardware description language. The non-linear RFEDD has been implemented in the 'Quite universal circuit simulator'.

Keywords: Qucs, RF equation defined device, inductance modelling, Verilog-A, CAD