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The RF Sheath, Nonlinearity and Stochastic heating: An extended analytical approach MICHAEL KLICK, Plasmatrix GmbH — For both proper modeling of RF discharges and model-based plasma diagnostics in RF discharges the analysis of the electron heating process is very important. At least at lower pressure, which is now more used now in many industrial processes as in the semiconductor manufacturing, the stochastic heating is the dominant electron heating mechanism. The analytic model for the nonlinearity of the RF sheath is based on a series expansion of the RF potential in the sheath which provides a parametric approach for the description of ion density distribution within the RF sheath. In contrast to established, analytical models, it is not restricted to a sinusoidal RF current. The electron dynamics is described by using the first three moments of the Boltzmann equation. In order to include also here nonlinear effects, harmonics in the RF current are considered as well. Finally the analytic results are discussed in comparison to experimental results of the electron collision rate for momentum transfer in RF discharges. For the comparison, the boundary condition of a sinusoidal RF voltage at the driven electrode is used.

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