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Numerical modelling of electron beams accelerated by the RF plasma boundary sheath¹ B.G. HEIL, J. SCHULZE, D. LUGGENHÖLSCHER, U. CZARNETZKI, Institute for Plasma and Atomic Physics, Ruhr-University Bochum, T. MUSSENBROCK, R.P. BRINKMANN, Institute for Theoretical Electrical Engineering, Ruhr-University Bochum — The exact mechanism of electron heating by the RF plasma boundary sheath is a current research topic. Electron beams accelerated by the RF sheath and travelling through the plasma bulk have been observed using phase resolved measurements of plasma emissions and also with a Monte-Carlo simulation. In this work the acceleration of electron beams by the RF sheath is numerically investigated. At lower pressures, the RF current and also the expansion and contraction of the sheath are modulated by the plasma series resonance (PSR) effect. This modulation can lead to multiple electron beams being accelerated per RF cycle. It can also temporarily cause larger sheath velocities than would be the case if the current is sinusoidal as is commonly assumed, leading to a larger acceleration of the electron beams. The hypothesis is that at least a part of what is called stochastic heating is due to these electron beams.

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