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Kinetic model of magnetized technological plasma[1] RALF PETER BRINKMANN, DENNIS KRÜGER, Theoretical Electrical Engineering, Ruhr-University Bochum — Plasma processes like magnetically enhanced reactive ion etching (MERIE), plasma ion assisted deposition (PIAD), and conventional and high power impulse magnetron sputtering (dcMS/HiPIMS) employ magnetized high density plasmas at relatively low pressures. This regime is very difficult to analyze. Fluid models do not apply and numerical kinetic approaches like particle-in-cell are rather expensive. An alternative may be "gyrokinetics". This theory - actually more a class of theories - was designed and successfully employed in the field of fusion plasmas. It relies on the insight that the fast gyro motion of magnetized particles can be mathematically separated from the slower drift motion and be integrated out, leaving only the dynamics on slower time scales and larger length scales. This contribution will present a gyrokinetic theory for magnetized technical plasmas that is based on first principles. The outset is a general kinetic description of the electron component, the final result is a closed system of parabolic differential equation in just two dimensions.

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