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Kinetic derivation of a gyro-fluid model for magnetized technological plasmas[1] RALF PETER BRINKMANN, DENNIS KRGER, Ruhr Univ Bochum — Plasma processes such as magnetically enhanced reactive ion etching (MERIE), plasma ion assisted deposition (PIAD), and dc and high power impulse magnetron sputtering (dcMS/HiPIMS) employ magnetized high density plasmas at relatively low pressures. This regime is very difficult to analyze. Conventional fluid models do not apply, and numerical kinetic approaches like particle-in-cell (PIC) are rather expensive. This contribution will present an alternative approach based on the framework of gyro-kinetics. This theory - actually more a class of theories 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. Starting from a general kinetic description of the electron component, the gyro-kinetic approach allows to systematically reduce the model to a system of two coupled partial differential equations in just two dimensions which may be termed a gyro-fluid model.

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