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Modeling of Tokamak Divertor Plasma for Weakly Collisional Parallel Electron Transport[1] M.V. UMANSKY, A.M. DIMITS, I. JOSEPH, T.D. ROGNLIEN, LLNL — Tokamak edge transport codes, such as UEDGE, rely on a collisional fluid plasma model valid only when $\lambda_{e,i} \ll L$ where λ is collisional mean free path, L the spatial scale of the problem. This condition is at best marginally satisfied in present-day tokamak edge plasmas, and likely to be violated in next-generation devices. In particular, departures from the Spitzer electron parallel heat conduction have a strong influence on poloidal energy flux in tokamak edge, and poses a serious limitation on the utility of existing transport models. This raises demands for developing accurate and efficient representation of parallel transport within edge-plasma modeling codes for the non-collisional and weakly collisional regimes. Such a representation has been developed in the context of Landau-fluid (LF) models [1]. Practical implementation of LF parallel transport models in the framework of an edge modeling code has become possible due to the recent invention of an efficient non-spectral method for non-local closure operators [2]. Here we describe the implementation of an LF-based model for the parallel plasma transport in the framework of the UEDGE code.

[1] Beer and Hammett, Phys. Plasmas 3, 4046 (1996).
[2] Dimits et al., Bull. Am. Phys. Soc. v. 57, n. 12 (2012)

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