Abstract Submitted
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Role of ion temperature anisotropy in 2D edge plasma transport.[1]
MENGLONG ZHAO, T.D. ROGNLIEN, ILON JOSEPH, Lawrence Livermore Natl Lab — A model of ion temperature anisotropy for transport in the tokamak edge/scrape-off-layer (SOL) is implemented in the 2D UEDGE fluid code. This is a generalization of the 1D work reported in [1-3]. The ion temperature is decomposed into two components: $T_{i\|}$ for the temperature parallel to the magnetic field, $\mathbf{B}$, and $T_{i\perp}$ for that perpendicular to $\mathbf{B}$. This anisotropy modifies the parallel viscosity expression, gives an additional force to the ion parallel momentum equation, and changes ion heat flux in the two directions. From previous kinetic simulations, e.g. using XG1a and COGENT codes, evidence for a strong ion temperature anisotropy are shown in hot SOL plasmas when collisional equilibration between $T_{i\|}$ and $T_{i\perp}$ is slow. Detailed impact of this anisotropy on 2D plasma profiles and flows is presented for single-null divertor geometry, including the effect of cross-field drifts and recycled neutral gas. Refs: [1] Z. Guo, X-Z. Tang, Phys. Plasmas 19 (2012) 082310; [2] S. Togo et al., J. Comp. Physics 310 (2016) 109; [3] T.D. Rognlien, T.A. Brengle, Phys. Fluids 24 (1981) 871.

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Thomas Rognlien
Lawrence Livermore Natl Lab

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