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Asymptotic-preserving Lagrangian approach for modeling anisotropic transport in magnetized plasmas LUIS CHACON, DIEGO DEL-CASTILLO-NEGRETE, ORNL — Modeling electron transport in magnetized plasmas is extremely challenging due to the extreme anisotropy between parallel (to the magnetic field) and perpendicular directions (the transport-coefficient ratio $\chi_\parallel/\chi_\perp \sim 10^{10}$ in fusion plasmas). Recently, a novel Lagrangian Green's function method has been proposed[1] to solve the local and non-local *purely* parallel transport equation in general 3D magnetic fields. The approach avoids numerical pollution, is inherently positivity-preserving, and is scalable algorithmically (i.e., work per degree-of-freedom is grid-independent). In this poster, we discuss the extension of the Lagrangian Green's function approach to include perpendicular transport terms and sources. We present an asymptotic-preserving numerical formulation, which ensures a consistent numerical discretization temporally and spatially for *arbitrary* $\chi_\parallel/\chi_\perp$ ratios. We will demonstrate the potential of the approach with various challenging configurations, including the case of transport across a magnetic island in cylindrical geometry.

[1]D. del-Castillo-Negrete, L. Chacón, *PRL*, **106**, 195004 (2011); D. del-Castillo-Negrete, L. Chacón, *Phys. Plasmas*, submitted (2011)

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