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A high-temporal-order, asymptotic-preserving spectral deferred correction algorithm for the anisotropic heat transport equation[1] L. CHACON, LANL, E. ENDEVE, ORNL — Modeling electron transport in magnetized plasmas is extremely challenging due to the extreme anisotropy between the parallel (to the magnetic field) and perpendicular directions (the transport-coefficient ratio $\chi_\parallel/\chi_\perp \sim 10^{10}$ in fusion plasmas). Recently, an asymptotic preserving semi-Lagrangian approach has been developed that is able to deal with arbitrary anisotropy ratios and non-trivial magnetic topologies in an accurate and efficient manner.[2] The approach is shown to avoid spatial discretization pollution, and to feature bounded numerical errors for *arbitrary* $\chi_\parallel/\chi_\perp$ ratios, which renders it asymptotic preserving. However, it is only first-order accurate in time. In this poster, we explore spectral deferred correction (SDC) methods[3] to produce a high-order asymptotic preserving algorithm, using the first-order semi-Lagrangian algorithm as the inner solver for the corrector step. We will show that the combination SDC+semi-Lagrangian features a numerical stability constraint, but one which is benign for sufficiently large anisotropy ratios.

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[2]L. Chacón, D. del-Castillo-Negrete, C. Hauck, *JCP*, submitted (2013)
[3]A. Dutt, L. Greengard, and V. Rokhlin, *BIT* **40**, 241 (2000)

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