Vlasov-type equations solved with a backward semi-Lagrangian method on a multi-patch geometry.

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The multi-patch approach with cubic splines provides a very interesting description of particle motion on a poloidal cross-section of a tokamak. It allows us to handle special geometries including an O-point and X-points [4, 1] We present a semi-Lagrangian method for the numerical resolution of Vlasov-type equations on multi-patch meshes. Following [2], we employ a local cubic spline interpolation with Hermite boundary conditions between the patches. The derivative reconstruction is adapted to cope with non-uniform meshes and also non-conforming situations. In the conforming case, the constraint in [2] of the number of points for each patch is removed at the price of solving a small global system. In that case, the local spline representations coincide with the corresponding global spline reconstruction. Alternatively, we can choose not to apply the global system and the derivatives can be approximated as in [2]. The influence of the most distant points diminishes as the number of points per patch increases. For uniform per patch configurations, a study of the explicit and asymptotic behavior of this influence has been led. All the numerical results are carried out in the Gyselalib++ library, a C++ rewrite of GYSELA [3].

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