Full f gyrokinetic ELMFIRE simulation including kinetic electrons

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Elmfire is a global gyrokinetic full f electrostatic particle-in-cell (PIC) code designed for first principle transport simulations of tokamak plasmas including both kinetic ions and electrons. It is based on a gyrokinetic model which includes the polarization drift implicitly in the guiding center equations. The equations of motion, the Poisson equation as well as the energy and angular momentum conserving rules will be presented. The difficulties of extending the present model to a grid size smaller than the larmor radius are discussed and experimental validation results that show the need for this extension are presented. A special emphasis will be given to the GAM Benchmark and validation work.