Effect of parallel flows and toroidicity on cross-field transport of pellet ablation matter in tokamak plasmas

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Abstract. The first complete set of time-dependent equations describing the cross-field advection of ionized pellet ablation matter in tokamak plasma caused by polarization in the non-uniform magnetic field has been developed and solved for numerically. New effects identified, including curvature drive by near sonic field-aligned flows, and the rotational transform of the magnetic field lines, are considered from the viewpoint of the parallel vorticity equation. Favorable agreement between theory and experimental fuel deposition profiles are obtained for both inner and outer wall pellet injection on the DIII-D tokamak.