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Particle, momentum and thermal transport in the PTRANSP code G. BATEMAN, F.D. HALPERN, A.H. KRITZ, A.Y. PANKIN, T. RAFIQ, Lehigh U., D.C. MCCUNE, R.V. BUDNY, K. INDIRESHKUMAR, PPPL — The combined effects of particle, momentum and thermal transport are investigated in tokamak discharges using a coupled system of transport equations implemented in the PTRANSP integrated modeling code. The magnetic diffusion equation is advanced separately, along with the evolution of the equilibrium. Simulations are carried out using theory-based models to compute transport, sources and sinks. Boundary conditions are either read from data or computed using a pedestal model for H-mode discharges. Different techniques are explored for controlling numerical problems [1] in time-dependent simulations that include sawtooth oscillations and other rapid changes in the profiles. Results for the density, temperature and toroidal angular velocity profiles are compared with experimental data.
[1] S.C. Jardin et al, "On 1D diffusion problems with a gradient-dependent diffusion coefficient"; G.V. Pereverzev and G. Corrigan, "Stable numeric scheme for diffusion equation with a stiff transport"; both papers to appear in Comp. Phys. Comm. (2008).

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