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Progress Towards a Coupled Kinetic Plasma - Neutral Transport Code[1] D.P. STOTLER, PPPL, C.S. CHANG, G. PARK, NYU, CPES TEAM — To provide a kinetic neutral simulation capability for the Center for Plasma Edge Simulation, a subroutine interface to the DEGAS 2 Monte Carlo neutral transport code has been implemented and coupled into the XGC neoclassical particle transport code. The DEGAS 2 routine simulates collisions of kinetic neutrals with a fluid plasma background provided by XGC; a complementary collision routine in XGC handles plasma particle collisions with a fluid neutral background. The procedure used to couple the codes has been designed so that the mass exchange rate in plasma-neutral collisions is the same in the two routines in a statistical sense; this is demonstrated in a practical calculation. However, the corresponding energy exchange rates differ noticeably (e.g., 25%) due to the velocity dependence of the charge exchange cross section and the non-Maxwellian character of both the ion and atom distribution functions. The coupled codes should still be useful for scientific investigations of neoclassical transport in diverted tokamaks and of the role of neutral transport in the plasma edge since the associated error in XGC's global energy conservation is $< 1\%$. Nonetheless, approaches to ensuring complete energy and momentum conservation are being assessed and will be discussed.

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Daren Stotler
Princeton Plasma Physics Lab

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