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[**X**] Theory [ ] Experiment

Optimizing Fueling Profiles in ITER and DIII-D by a Gyrotron-Powered Pellet Injector (GPPI),* F.W. Perkins and P.B. Parks, *GA* – The fueling system is an essential element in a tokamak reactor and control of its thermonuclear reactions. Pellets, accelerated by gyrotron-driven pellet injector [1], will provide sources of plasma density and energy. Subsequent evolution of density profiles depends strongly on toroidicity and position within a magnetic surface. We report the studies of ITER experiments for optimizing fueling profiles. With modest modifications, a scaled demonstration of GPPI is possible on DIII-D. For the ITER example, a GPPI has been designed to maximize four pellet properties: speed ($V>3k_{km/s}$), barrel bore ($d\leq 10.0$mm), launch position (inside magnetic midplane), and launch trajectory (orthogonal to separatrix). The speed anticipated for the GPPI is more than a factor-of-10.0 above the limit of 300 m/s for a conventional guide-tube. The penetration of ablation ionization source increases a factor-of-6.0 with an order-of-magnitude increase in V. Previous models with $V^{1/3}$ scaling, predicted just a factor-of-2.2. Breakdown limitations will also be addressed.

[1] P.B. Parks and F.W. Perkins, Nucl. Fusion 46, 770 (2006).

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