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Optimizing Fueling Profiles in ITER and DIII-D by a Gyrotron-Powered Pellet Injector (GPPI)[1] F.W. PERKINS, P.B. PARKS, General Atomics — 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≤10.0mm), 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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