

Advanced plasma edge disturbance mitigation technique for ITER

The new pellet injector gun mechanism designed for high repetition rate pellet ELM pacing was installed on the DIII-D pellet injector in mid September. Initial testing of the new gun demonstrated 20-Hz capability with high reliability (20 out of 20 pellets requested) and modest pellet speeds (150-200 m/s) as required for this application. This technology that was developed at ORNL with VLT funding will be tested on DIII-D plasmas in the coming weeks with three pellet guns operating at up to 60 Hz. The goal of these experiments is to artificially induce ELMs in DIII-D at rates that are ten times greater than the natural ELM frequency. This scenario simulates the conditions thought to be required in ITER to prevent damage to plasma facing components by large naturally occurring ELMs. This same technology is being incorporated into the design of the ITER pellet injection system, which can be used for both pellet fueling with large 5-mm pellets and ELM pacing with smaller 3-mm pellets. Near-term plans are to modify the other two guns on the DIII-D pellet injector and perform experiments that simulate the ITER pellet ELM pacing scenario.