

Plasma Edge Disturbance Mitigation Technique Demonstrated on DIII-D

The plasma edge in a magnetic fusion device can have a periodic disturbance known as an edge localized mode (ELM) that can potentially damage the plasma chamber from pulsed high thermal loads. A technique has been developed to mitigate these effects by injecting frequent small solid hydrogen pellets into the edge of the plasma. The pellets are fired by a pneumatic gun using the same technology developed by the VLT for fueling fusion plasmas. The small pellets are able to trigger very small ELMs that have a much lower pulsed thermal load than the naturally occurring lower frequency ELMs. This technique has been used on the DIII-D tokamak to demonstrate the reduction of ELM energy onto the plasma chamber by a factor of 4. This technique can potentially be employed on ITER to prevent large ELMs from occurring that can reduce the lifetime of the plasma facing components in the chamber and thus increase the machine availability for burning plasma research.