

ABSTRACT

The transition from low confinement (L-mode) to high confinement (H-mode) plasmas has been directly produced by injecting frozen deuterium pellets in the DIII-D tokamak. Pellet injection was able to reduce the power threshold for access to the H-mode by as much as 23%. H-mode transitions were produced at edge electron and ion temperatures below the L-mode value as a result of the significant increase in the edge electron density after pellet injection. This implies that a critical edge temperature is not necessary for H-mode transitions. The production of a steep edge density gradient is important, whereas the radial extent of pellet deposition is not important. The experimentally determined edge plasma parameters were well below those predicted by several theories of the H-mode transition to trigger the H-mode.