Localized turbulence suppression and increased flow shear near the $q = 2$ surface during internal transport barrier formation

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Abstract

Broadband turbulent fluctuations in the plasma density are transiently suppressed when low-order rational q-surfaces first appear in negative central magnetic shear plasmas on the DIII-D tokamak and can lead to the formation of internal transport barriers. Increased localized flow shear is simultaneously observed and transiently exceeds the measured turbulence decorrelation rate, providing a mechanism to trigger the formation of the transport barrier. This increased flow shear and turbulence suppression propagates radially outward, following the $q = 2$ surface.

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