

First measurement of pressure gradient-driven currents in tokamak edge plasmas

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Abstract. Localized currents driven by pressure gradients play a pivotal role in the magnetohydrodynamic stability of toroidal plasma confinement devices. We have measured the currents generated in the edge of L– (low) and H– (high confinement) mode discharges on the DIII-D tokamak, utilizing the Zeeman effect in an injected lithium beam to obtain high resolution profiles of the poloidal magnetic field. We find current densities in excess of 1 MA/m^2 in a 1 to 2 cm region near the peak of the edge pressure gradient. These values are sufficient to challenge edge stability theories based on specific current formation models.

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