Observation of plasma rotation driven by static non-axisymmetric magnetic fields in a tokamak

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ABSTRACT

We present the first evidence for the existence of a neoclassical toroidal rotation driven in a direction counter to the plasma current by non-axisymmetric, non-resonant magnetic fields. At high-beta and with large injected neutral beam momentum, the non-resonant field torque slows down the plasma toward the neoclassical "offset" rotation rate. With small-injected neutral beam momentum, the toroidal rotation is accelerated toward the offset rotation, with resulting improvement in the global energy confinement time. The observed magnitude, direction, and radial profile of the offset rotation are consistent with neoclassical theory predictions [A.J. Cole, et al., Phys. Rev. Lett. **99**, 065001 (2007)].

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