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Intrinsic momentum transport in tokamaks with tilted elliptical flux surfaces[1] JUSTIN BALL, FELIX PARRA, MICHAEL BARNES, University of Oxford, WILLIAM DORLAND, University of Maryland, GREGORY HAMMETT, Princeton Plasma Physics Laboratory, PAULO RODRIGUES, NUNO LOUREIRO, Universidade de Lisboa — Recent work demonstrated that breaking the up-down symmetry of tokamaks removes a constraint limiting intrinsic momentum transport, and hence toroidal rotation, to be small.[2] We show, through MHD analysis, that ellipticity is most effective at introducing up-down asymmetry throughout the plasma. Using GS2, a local δf gyrokinetic code that self-consistently calculates momentum transport, we simulate tokamaks with tilted elliptical poloidal cross-sections and a Shafranov shift. These simulations show both the magnitude and poloidal dependence of nonlinear momentum transport. The results are consistent with TCV experimental measurements[3] and suggest that this mechanism can generate rotation with an Alfven Mach number of several percent in a tilted elliptical ITER-like machine. It appears that rotation generated with up-down asymmetry may be sufficient to stabilize the resistive wall mode in reactor-sized devices.

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