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Kinetic ballooning mode turbulence in low-magnetic-shear 3D equilibria[1] I.J. MCKINNEY, University of Wisconsin-Madison, Madison, Wisconsin, USA, M.J. PUESCHEL, Institute for Fusion Studies, The University of Texas at Austin, Austin, Texas, USA, C.C. HEGNA, B.J. FABER, P.W. TERRY, University of Wisconsin-Madison, Madison, Wisconsin, USA, A. ISHIZAWA, Graduate School of Energy Science, Kyoto University, Uji, Kyoto, Japan, J.N. TALMADGE, D.T. ANDERSON, University of Wisconsin-Madison, Madison, Wisconsin, USA — Electromagnetic flux-tube simulations of the HSX stellarator using the gyrokinetic code GENE show that the kinetic ballooning mode (KBM) threshold β^{KBM} is an order of magnitude smaller than the MHD ballooning limit when a strong ion temperature gradient is present. As the ion temperature gradient becomes weaker, β^{KBM} approaches the MHD ballooning limit. β^{KBM} is also sensitive to locally-self-consistent modifications of the magnetic shear. Simulations of Heliotron-J also display behavior similar to HSX with respect to β^{KBM}. Finite-β ($\approx 0.5\%$) simulations of HSX exhibit significant nonlinear finite-β stabilization when saturation is achieved. We also introduce a fluid model that expands upon a three-field model [C.C. Hegna et al., Phys. of Plasmas **25**, 022511] by including finite-β effects. We employ this reduced model to investigate KBM turbulence saturation in 3D magnetic equilibria both when strong ion temperature gradients are present and as the magnetic shear is varied.

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