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Shear Flow Instabilities in the Presence of Flow Curvature SUDIP SEN, Physics Department, Delhi University, Delhi 110007, India — A nonlocal theory of the electrostatic parallel velocity shear instability in a three-dimensional slab with a uniformly sheared magnetic field has been developed. It is shown that in the limit of a weak parallel velocity gradient, the linear growth rate can be increased depending upon the direction of the magnetic shear with respect to the radial curvature of the parallel velocity profile (d^2v/dx^2). When these parameters have the same sign, the growth rate can actually be stronger than in the limit of no magnetic shear. In this limit of increased instability, the eigenmode is broadened, thus producing enhanced transport. For strong parallel velocity gradients that are more typical of flows in tokamaks, the effect of the varying Doppler shift becomes more prominent on the stability of the mode, the net result being that the sensitivity of the growth rates on the sign of the magnetic shear becomes insignificant. This effect, however, is effectively offset when a finite density gradient is included. When the density scale length is of order the scale length of v, the growth rate is moderately reduced, but becomes dependent again upon the sign of the magnetic shear.

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