Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Low-frequency instabilities in the presence of inhomogeneous parallel flows SUDIP SEN, University of Delhi — Here we present a novel theory in fluid flow instabilities, which has significant implications in our conventional knowledge in various areas, from basic fluid dynamics, fusion technology to space sciences. We have shown that (contrary to the usual believe that a parallel flow shear (first spacial derivative) is always destabilizing to various fluid instabilities) the destabilizing influence of the shear in the parallel flow can be suppressed altogether if one takes the effect of the flow curvature (second spatial derivative) into account. The transverse curvature in the parallel flow can overcome the destabilizing influence of the shear and can render the low frequency modes stable. This novel theory is applicable to various low-frequency waves and instabilities in various physical systems from laboratory, space, high temperature plasma and fluid medium to magnetohydrodynamics. This is because it is only natural that all actual flow profiles must in principle be curved rather than a pure straight line (only in this case the flow shear will be relevant), the inclusion of curvature in the flow profile rather than the shear alone is therefore more realistic.

Sudip Sen
University of Delhi

Date submitted: 01 Aug 2007 Electronic form version 1.4