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Linear flow dynamics near a T/NT interface[1] MIGUEL TEIXEIRA, University of Lisbon, CARLOS SILVA, Technical University of Lisbon — The characteristics of a suddenly-inserted T/NT interface separating a homogeneous and isotropic shear-free turbulence region from a non-turbulent flow region are investigated using rapid distortion theory (RDT), taking full account of viscous effects. Profiles of the velocity variances, TKE, viscous dissipation rate, turbulence length scales, and pressure statistics are derived, showing very good agreement with DNS. The normalized inviscid flow statistics at the T/NT interface do not depend on the form of the assumed TKE spectrum. In the non-turbulent region, where the flow is irrotational (except within a thin viscous boundary layer), the dissipation rate decays as z^{-6}, where z is distance from the T/NT interface. The mean pressure exhibits a decrease towards the turbulence due to the associated velocity fluctuations, consistent with the generation of a mean entrainment velocity. The vorticity variance and dissipation rate display large maxima at the T/NT interface due to the existing inviscid discontinuities of the tangential velocity, and these maxima are quantitatively related to the thickness of the viscous boundary layer (VBL). At equilibrium, RDT suggests that the thickness of the T/NT interface scales on the Kolmogorov microscale.

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Carlos Silva
Technical University of Lisbon

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