

# AeroElastic Flutter Analysis in Viscous Airflow : Continuum models

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## Abstract :

Most of aeroelastic Flutter Analysis (as distinguished from Computation) has assumed nonviscous potential flow [1]. In this paper we extend the theory to viscous flow . The momentum conservation law is the Navier Stokes equation rather than the Euler Full Potential equation and the Energy Flux model of Landau Lifshitz[2] is used to yield the pressure dynamics. The main result is that the linear theory linearised about the equilibrium state of zero structure state and steady air flow does not develop any lift. In consequence we cannot prove the Hopf Bifurcation Theory as in [3] to characterise Flutter as an LCO and need to invoke the Prandtl Boundary Layer Theory and Layer Separation Model for further progress on the problem.

## References

1. E H Dowell ed.A modern course in aeroelasticity, Kluwer Academic Publishers, 2004.Chapter 4
2. L.D.Landau and E.M. Lifshitz. Fluid Mechanics, 2 nd Ed .1987. p. 193 et seq
3. A V Balakrishnan.NonLinear Possio Integral Equation and AeroElastic Flutter Limit Cycle Oscillation Journal of NonLinear Studies vol .16, no .2, pp95 - 118, 2009