

Separation bubbles in transonic, supersonic and hypersonic flows

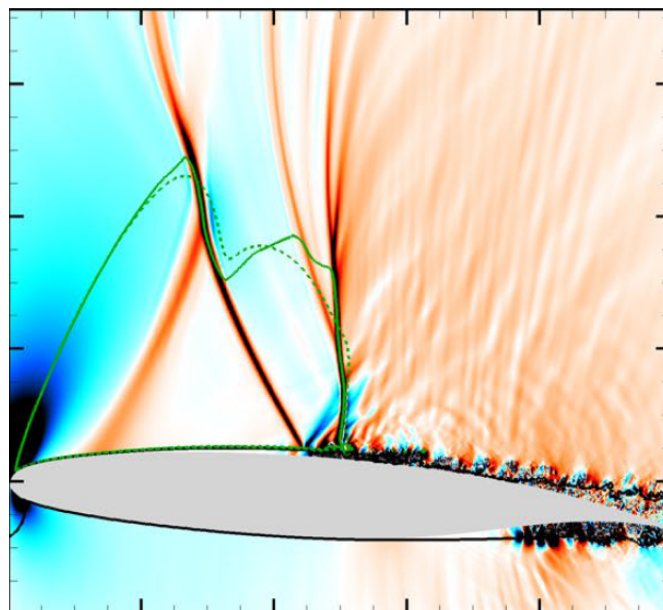
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[LMFL Fluid Mechanics Webinar Link](#)

Abstract

In this contribution, we will consider separation phenomena over a range of Mach numbers, based on insights obtained from recent direct and large-eddy simulations and looking forward to routine use of exascale high performance computing. In the transonic flight regime, a two-dimensional airfoil buffet phenomenon that limits the flight envelope. Flow response is explored using spectral proper orthogonal decomposition, also showing the effect of boundary layer tripping. At fully supersonic speeds, linear and nonlinear mechanisms of unsteadiness based on shock-impingement cases are identified and different modes of unsteadiness are linked to stability theory and reduced order models. Finally, we consider flow over two- and three-dimensional bumps, identifying a common oscillator-type of behaviour.



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