Abstract Submitted
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Investigation of compressibility effects on a plunging airfoil under dynamic stall conditions[1] RENATO FUZARO MIOTTO, University of Campinas, DATTA GAITONDE, The Ohio State University, WILLIAM ROBERTO WOLF, University of Campinas, MIGUEL VISBAL, Air Force Research Laboratory — Large-eddy simulations are performed to study the compressibility effects on an airfoil under deep dynamic stall condition. In the present work, an SD7003 airfoil in plunging motion is considered at a chord Reynolds number of Re = 60,000 and freestream Mach numbers M = 0.1 and 0.4. These conditions aim to meet the current renewed interest in low- and moderate-Reynolds number unsteady aerodynamics, which finds applications in the design of small unmanned air vehicles and micro air vehicles. The current numerical methodology has already been validated for M = 0.1 and is herein extended for other flow regimes. In addition, modal decomposition techniques are also employed to analyze the complex off-surface flow structures associated with the dynamic stall, and to assess its onset mechanism for different compressible scenarios.

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