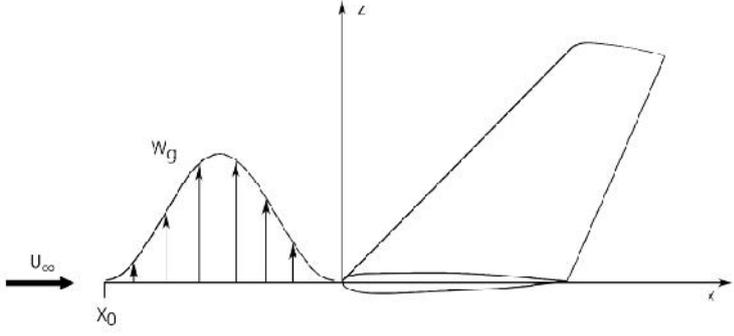
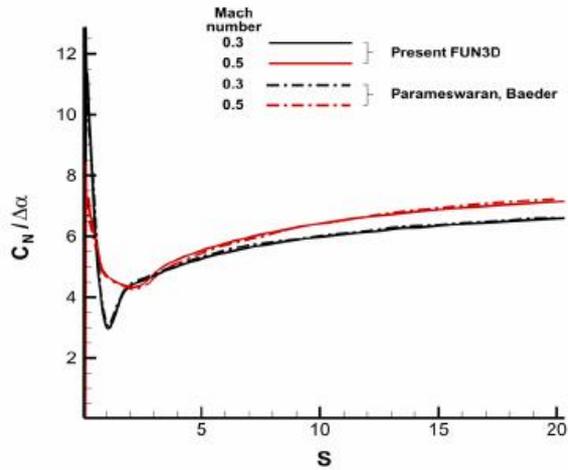


Support to Safety Analysis of Hydrogen and Fuel Cell Technologies

Verification type	Numerical Solution
Database reference	NUM-1
Topic / Application	Aerodynamics Aeroelastics
Physics	Dynamic Gust response
Summary	Verification of FUN3D CFD Code for aerofoil dynamic gust response, primarily using numerical solutions but also an analytical solution.
Description	<p>This paper undertakes verification upon the NASA CFD code FUN3D. The gust capability is verified by computing the response of an airfoil to vertical perturbation in velocity. This result is compared with other numerical solutions which are presented as a benchmark. An analytical solution is also used for verification. A reduced order model is also created and comparison made for verification purposes.</p> <p>In all cases a general system response parameter is used for comparison, for example the time history of the normal force coefficient.</p>
Case Title	Development, Verification and Use of Gust Modeling in the NASA Computational Fluid Dynamics Code FUN3D
Authors	<i>Bartels, Robert E.</i>
Year	2012
Online reference	NASA/TM-2012-217771
Case image	 <p>The diagram illustrates the setup for a gust response analysis. It shows a 2D coordinate system with a horizontal x-axis and a vertical z-axis. A free stream velocity U_∞ is indicated by a horizontal arrow pointing to the right. A gust profile w_g is shown as a bell-shaped curve starting at a position x_0 on the x-axis. The airfoil cross-section is shown as a thin, curved shape positioned downstream of the gust. The airfoil's leading edge is at the origin (0,0) of the coordinate system.</p>
Governing equations	N/A

Results



This is a comparison of the normal force coefficient (evaluated through time S) computed by FUN3D and by another numerical solution