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Noise prediction of a low speed airfoil[1] YASER KHALIGHI, Stanford University, MENG WANG, University of Notre Dame, DANIEL BODONY, PARVIZ MOIN, Stanford University — The goal of this work is accurate and efficient prediction of flow generated noise in the presence of solid objects. Flow around a low speed airfoil is considered at chord Reynolds number of Re = 150 000. This flow configuration represents an important aeroacoustics problem with complex physical effects including solid boundaries, boundary layers with pressure gradient, transition and turbulent wake. In the framework of Lighthill's acoustics analogy the procedure of sound prediction is divided into two steps: calculation of sound sources generated by flow and propagation of sound into far field. To calculate flow induced noise sources we performed a high resolution LES as well as a more affordable LES on fewer grid points. Sound propagation and diffraction by the airfoil are accurately are accounted for using numerically computed Green's functions tailored to the airfoil geometry. We will compare the noise spectra using this Green's function with previous calculations using an approximate Green's function.

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