

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Prediction of pressure fluctuations in turbulent flows using the immersed boundary method¹ SEONGWON KANG, GIANLUCA IACCARINO, FRANK HAM, PARVIZ MOIN, Center for Turbulence Research, Stanford University — The immersed boundary (IB) method has been widely used to model flow problems in complex geometries. We investigate the capability of the IB method to predict wall pressure fluctuations in turbulent flows. We introduce a new numerical treatment of the cells crossed by the IB that ensures mass conservation and provides accurate evaluation of the wall pressure. The present approach has been successfully validated through computations of the space-time correlations of the wall-pressure fluctuations. Compared to the original IB method (Fadlun et al., 2000), the present approach shows better agreement with the standard DNS results. When applied to turbulent flow around an airfoil, the computed flow statistics - the mean/RMS and power spectra of the wall pressure - are in good agreement with the LES performed on body-fitted mesh and experiment (Roger and Moreau, 2004).

¹Supported by Stanford DOE ASC program.

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Date submitted: 11 Aug 2009

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