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**Subgrid-scale modeling effects on wall pressure fluctuations**[1]
MENG WANG, University of Notre Dame — Accurate computations of wall pressure fluctuations underneath a turbulent boundary layer are of interest in aeroacoustic and hydroacoustic applications. In this study LES predictions of the spatio-temporal statistics of fluctuating wall pressure are systematically investigated in a plane channel at friction Reynolds number of 395 by comparison with DNS results. As expected, LES predicts well the low wavenumber/frequency ranges of the wall pressure spectra, but underpredicts the higher wavenumber/frequency spectra and hence the magnitude of wall pressure fluctuations due to a combination of filtering, subgrid-scale modeling, and numerical errors. Another significant effect of LES is the overprediction of correlation time and length scales, which is consistent with previous observations regarding velocity space-time correlations. Furthermore, subgrid-scale modeling is shown to significantly alter the convection velocities of small-scale pressure fluctuations. The underlying causes for these errors are analyzed, and means to improve LES predictions are explored.

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