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The effects of heating on instability waves and noise in subsonic jets[1] ZHENHUA WAN, HAIHUA YANG, XINGCHEN ZHANG, DEJUN SUN, University of Science and Tech of China — We performed large eddy simulation(LES) for two subsonic transitional jets, i.e. a cold jet and its heated counterpart, with a relatively high Reynolds number. In the far field, the noise radiation at small aft angles is enhanced by heating, while the noise intensity at large angles to jet axis is reduced. The noise enhancement at small aft angles might be attributed to the change of the evolution of instability wave. Based on LES mean flow, the N- factors are obtained by solving linear parabolized stability equations(PSE), which shows that the peaks of N-factors move upstream and $m = 0$ mode is mostly influenced due to heating. From N-factor, it is also known that the dominant instability waves in both jets should be produced by nonlinear interaction. For better understanding such nonlinear process, the nonlinear interaction model (NIM) based on PSE solution and acoustic analogy is evaluated carefully by comparing the model results with that of simulation. It is found that NIM gives relatively reasonable radiation pattern for $m = 0$ mode in both jets, but less satisfactory results are obtained for higher m modes.

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