

عنوان مقاله:

Large-Eddy Simulation of a Laminar Separation Bubble

محل انتشار:

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خلاصه مقاله:

Large-eddy simulation of a laminar separation bubble on a flat plate has been performed and compared with the data in the literature. Suitability of different subgrid-scale models has been examined for simulation of transition. Comparison of various parameters and three-dimensional visualization of instantaneous flow fields indicate that standard Smagorinsky model, being too dissipative, is not suitable for this kind of problem and fails to properly resolve transition. With the application of low Reynolds number correction and a reduced model constant, a good agreement with the dynamic model is obtained at a lower computational cost. Of the three SGS models investigated, dynamic model gives the most physically accurate description of transition. The simulations illustrate that the appearance of Λ -vortices, vortex stretching and break down of longitudinal streaks characterize the transition process. Low values of reverse flow make it clear that a convective instability is involved. It is concluded that the initial amplification of disturbances is due to Tollmien-Schlichting mechanism while the roll-up of the shear layer takes place due to Kelvin-Helmholtz instability. It is observed that the universal log-law profile is not reached by the velocity profiles even far downstream.

کلمات کلیدی:

Separation bubble, Large, Smagorinsky model, Dynamic model, eddy simulation

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