

Numerical stability of the wake behind a NACA0012 wing profile

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Abstract

Numerical simulations of the velocity field behind a wing with a NACA0012 airfoil at low Reynolds numbers has been carried out. Specifically, we have obtained results for Reynolds numbers ranging from 333.33 to 1333.33, and for an angle of attack of 9° .

As it is depicted in figure 1, for Reynolds number equal to 666.67 the wake behind the wing is stable, but for 1333.33 we have obtained periodic oscillations in the wake of the wing. These oscillations are due to instabilities appearing in the wing. These disturbances cause oscillations in the pressure forces exerted by the airflow over the wing.

The radial and axial profiles of the axial vorticity component and the azimuthal velocity component, and the radial profile of the axial velocity component have been compared to the theoretical models for trailing vortices by G. K. Batchelor and by D. W. Moore and P. G. Saffman.

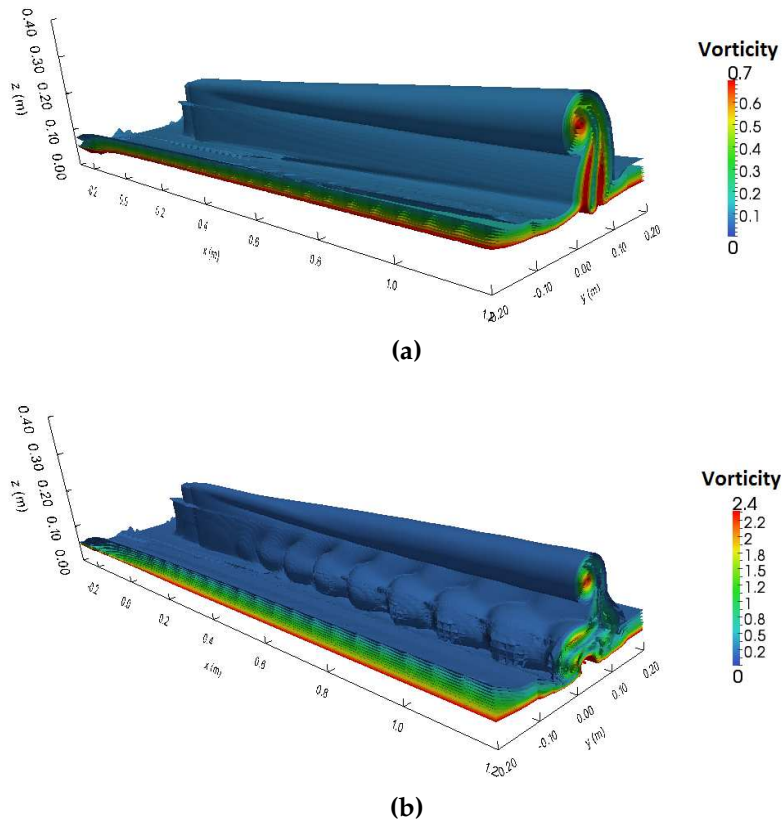


Figure 1: Wake behind the wing represented with vorticity isosurfaces for $Re = 666.67$ (a) and for $Re = 1333.33$ (b).

REFERENCES

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