Asociación Argentina
de Mecánica Computacional

Mecánica Computacional Vol XXIX, págs. 4079-4079 (resumen)
Eduardo Dvorkin, Marcela Goldschmit, Mario Storti (Eds.)
Buenos Aires, Argentina, 15-18 Noviembre 2010

# COMPUTER SIMULATION AND ANALYSIS OF THE LAMINAR BOUNDARY LAYER OVER NACA0012 AIRFOIL USING ULTRA-LOW REYNOLDS NUMBER

**Antonio C. H. Marques**[a] **and José L. Doricio**[b]

[a]*Universidade Federal da Fronteira Sul, Brazil, achm@uffs.edu.br, http://www..uffs.edu.br*

[b]*Escola de Engenharia de São Carlos - Universidade de São Paulo, Brazil, doricio@usp.br, http:/www.eesc.usp.br*

**Abstract**. This work presents an application of the virtual boundary method for simulations with ultra-low Reynolds number over an profile NACA0012 airfoil type. The incompressible flow is solved through numerical solution of the Navier-Stokes equations (direct simulation - DNS), using a model of immersed boundaries to model the airfoil. This methodology allows the modeling of complex geometries immersed in the flow through two independent grids: one Eulerian to represent the fluid and a Lagrangian to model the fluid-structure interface. The analysis of the boundary layer is widely studied phenomena in turbulence, by definition, are observed in three-dimensional flows. This work treat of an approximation of laminar boundary layer in the case of two-dimensional flow. Results for modeling the laminar boundary layer are presented for the airfoil profile ,subject to attack angles 2, 8 and 30 degrees, and the phenomena of thickening of the boundary layer and the bubble separation and are discussed.