Asociación Argentina
de Mecánica Computacional

Mecánica Computacional Vol XXXVII, págs. 1277-1277 (resumen)
A. Cardona, L. Garelli, J.M. Gimenez, P.A. Kler, S. Márquez Damián, M.A. Storti (Eds.)
Santa Fe, 5-7 Noviembre 2019

VORTEX INDUCED VIBRATIONS OF AN ELASTICALLY MOUNTED CYLINDER ARRANGED IN SIDE BY SIDE WITH A STATIONARY CYLINDER

Roberto Sosa[a], Alejandro D. Otero[b], Héctor R. Diaz Ojeda[c] and Leo M. Gonzalez[c]

[a] *Laboratorio de Fluidodinámica, Facultad de Ingeniería, Universidad de Buenos Aires, Paseo Colón 850, C1063ACV, Buenos Aires, Argentina. http://laboratorios.fi.uba.ar/lfd/*

[b] *Facultad de Ingeniería, Universidad de Buenos Aires - Centro de Simulación Computacional para Aplicaciones Tecnológicas, CONICET, Godoy Cruz 2390, C1425FQD, Buenos Aires, Argentina*

[c] *CEHINAV, Canal de Ensayos Hidrodinámicos de la Escuela Técnica Superior de Ingenieros Navales, Universidad Politécnica de Madrid, España*

Keywords: vortex-induced vibration, cylinder, side by side, OpenFOAM.

Abstract. In this work, numerical simulations of an elastically mounted cylinder, arranged in side by side configuration with a stationary cylinder, subjected to vortex-induced vibration (VIV) are conducted. We use OpenFOAM to perform flow simulations and the dynamic mesh method in OpenFOAM to adapt the body fitted mesh. The elastically mounted cylinder has only one DOF (it is allowed to move only transverse to the incoming flow) and the VIV phenomena is investigated in a two dimensional laminar flow regime with fixed Reynolds number at 150. Both cylinders have the same diameter D, and the center to center distance between the two cylinders is varied from 2D up to 4D. For the elastically mounted cylinder, a low reduced mass is considered and the structural damping coefficient is assigned to be zero, which produces high amplitude oscillations. For each arrangement, the reduced velocity is varied systematically in a wide range to examine its influence on the dynamic responses of both the elastically mounted cylinder and the wake behind it. The characteristic parameters, such as the Strouhal number of vortex shedding, the drag and lift forces acting on the cylinders and the maximum amplitude of vibration, are computed to characterize the effect on the VIV produced by the stationary cylinder proximity. Flow patterns were studied in an attempt to characterize the wake response based upon the associated instantaneous vorticity fields.