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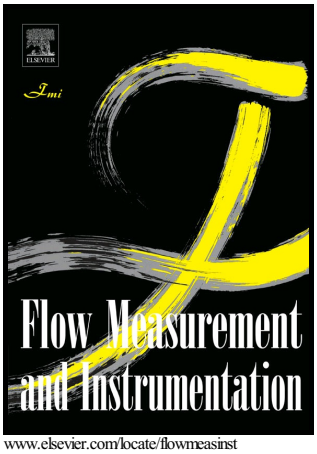

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Abstract

An experimental study was carried out to investigate the effect of a splitter plate on wake flows downstream of a circular cylinder symmetrically placed in a confined channel. A particle image velocimetry (PIV) measurement was applied to visualize the flow structure and analyze changes in the vortex shedding process. The control elements of the splitter plate length, *L/D* (*D* is the cylinder diameter) was varied from 0 to 1.5 and Reynolds number, Re_D was considered at 2400 and 3000. The experimental results showed that the splitter plate had an influence on stabilization of wake turbulences in a confined channel. For shorter splitter plate length of L/D = 0.5 and 0.75 cases, flow structures were significantly modified and the vortex shedding frequency decreased as compared with bare cylinder cases. For longer splitter plate length of $L/D = 1$, 1.25 and 1.5 cases, the generation of a secondary vortex was observed based on the snapshot proper orthogonal decomposition (snapshot POD) analysis. In addition, turbulent characteristics corresponding to turbulent kinetic energy (TKE) and Reynolds shear stress correlations took the lowest values and the dominant vortex shedding frequency disappeared. There was an optimal value of the splitter plate length at L/D = 1 on suppression of velocity fluctuations. Moreover, the stabilizing effect of a splitter plate was more obvious at Reynolds number of Re_D = 3000 than that at Re_D = 2400.

***Keywords**: Flow control; Splitter plate; Confined circular cylinder; Wake suppression; Instability; PIV*

Nomenclature

D	Circular cylinder diameter
f_s	Vortex shedding frequency
G	Gap distance
L	Splitter plate length
L_s	Vortex formation length
Re_D	Reynolds number (DU_∞/γ)
St	Strouhal number ($f_s D / U_\infty$)