

Multiscale Structures and Their Evolution in a Screen Cylinder Wake

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Abstract : The turbulent structures in the wake ($x/d = 10$ to 60) of a screen cylinder have been reduced to understand the roles of the various structures as evolving downstream by comparing with those obtained in a solid circular cylinder wake at Reynolds number, Re of 7000 . Using a wavelet multi-resolution technique, the flow structures are decomposed into a number of wavelet components based on their central frequencies. It is observed that in the solid cylinder wake, large-scale structures (of frequency f_0 and $1.2 f_0$) make the largest contribution to the Reynolds stresses although they start to lose their roles significantly at $x/d > 20$. In the screen cylinder wake, the intermediate-scale structures ($2f_0$ and $4f_0$) contribute the most to the Reynolds stresses at $x/d = 10$ before being taken over by the large-scale structures (f_0) further downstream.

Keywords : turbulent structure, screen cylinder, vortex, wavelet multi-resolution analysis

Conference Title : ICFMHTT 2014 : International Conference on Fluid Mechanics, Heat Transfer and Thermodynamics

Conference Location : Istanbul, Türkiye

Conference Dates : February 17-18, 2014