Journal of Physics: Conference Series 2017 vol.899 N5

Vortex shedding behind an obstacle in a channel under transition to turbulence in steady and pulsating flows

Molochnikov V., Kalinin E., Mazo A., Malyukov A., Okhotnikov D., Dushina O.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Published under licence by IOP Publishing Ltd. Experimental research and DNS of separated flow over a spanwise semicylindrical rib mounted in a rectangular channel have been performed for the cases of steady and pulsating flow with transition to turbulence. Spiral motion of fluid behind the rib directed from the channel walls towards the channel symmetry plane has been shown to govern the formation of large vortices in the mixing layer starting from some critical Reynolds number. The mechanism of origination of such motion has been hypothesized. The effect of frequency and amplitude of forced freestream pulsations on the vortex pattern behind the rib has been described.

http://dx.doi.org/10.1088/1742-6596/899/5/052012

References

[1] Yanase S, Kawahara G and Kiyama H 2001 J. Phys. Soc. Jap. 70 3550-55
[2] Dikovskaya I D, Dovgal A V and Sorokin A M 1999 Thermophysics and Aeromechanics 6 25-33
[3] Dovgal A V and Sorokin A M 2002 Thermophysics and Aeromechanics 9 183-90
[4] Williams P T and Baker A 1997 J. Int. Numerical Method in Fluids 24 1159-83
[5] Tylli N, Kaiktsis L and Ineichen B 2002 Phys. Fluids 14 3835-45
[6] Kitoh A, Sugawara K, Yoshikawa H and Ota T 2007 J. Heat Transfer 129 1141-55
[7] Nie J H and Armaly B F 2003 Trans. ASME 125 422-28
[8] Kalinin E I, Mazo A B and Isaev S A 2016 IOP Conference Series: Materials Science and Engineering 158 012047
[9] Dushina O A, Molochnikov V M, Mikheev N I and Paerely A A 2012 Thermophysics and Aeromechanics 19 259-66
[10] Kornilov V I 2000 Three-Dimensional Turbulent Near-Wall Flows in Streamwise Corners (Novosibirsk: Nauka. Siberian Publishing Firm of RAS) 399