

Behaviours of Energy Spectrum at Low Reynolds Numbers in Grid Turbulence

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Abstract : This paper reports an experimental investigation of the energy spectrum of turbulent velocity fields at low Reynolds numbers ($R\lambda$) in grid turbulence. Hot wire measurements are carried out in grid turbulence with subjected to a 1.36:1 contraction of the wind tunnel. Three different grids are used: (i) large square perforated grid (mesh size 43.75 mm), (ii) small square perforated grid (mesh size 14 and (iii) woven mesh grid (mesh size 5mm). The results indicate that the energy spectrum at small $R\lambda$ does not follow Kolmogorov's universal scaling. It is further found that the critical Reynolds number, $R\lambda_c$ below which the scaling breaks down is around 25.

Keywords : energy spectrum, Taylor microscale, Reynolds number, turbulent kinetic energy, decay exponent

Conference Title : ICFMT 2014 : International Conference on Fluid Mechanics and Thermodynamics

Conference Location : Penang, Malaysia

Conference Dates : December 16-17, 2014