conferenceseries.com

2nd World Conference on AEROSPACE ENGINEERING

August 18-19, 2022| Webinar

Investigations of heat transfer and flow characteristics of wall-bounded jets on a sinusoidal wavy surface

Tej Pratap Singh
Indian Institute of Technology Delhi, India

Turbulent wall-bounded jets are used in various practical engineering and industrial applications, including cooing of electronics devices, heat exchange systems, and cooling of gas turbine blades. The aim of the present computational study is to investigate an enhancement in heat transfer using different wall-bounded jets. Detailed discussions on the effect of the amplitude of the wavy surface and offset ratio are provided. The offset ratio varies from 0 to 5.0, where the value of zero represents a turbulent wall jet. The amplitude of sinusoidal wall is ranging from 0.1 to 0.8. The computed results are validated with the reported experimental results. The validation shows that among four turbulence models used, namely, renormalization group k-ϵ (RNG), realizable k-ϵ, standard k-ω and shear-stress transport k-ω (SST), the latter provides a good agreement with the experimental results. The position of the offset ratio and amplitude of the wavy surface affect the heat transfer enhancement. An enhanced heat transfer of 29.46% for turbulent wall jet is achieved for the amplitude of 0.8. The thermal-hydraulic performance (THP) increases for the wall jet by approximately 15% for the maximum amplitude considered. The axial position of the reattachment length and primary vortex centre increase with amplitude. Correlations are developed for the average Nusselt number, vortex centre, reattachment point, and thermal-hydraulic performance parameter with the amplitude of the sinusoidal wall.

Biography

Tej Pratap Singh has completed his PhD from NIT Rourkela, India. Curently, he is a postdoctoral fellow in the department of Applied Mechanics at Indian Institute of Technology Delhi, New Delhi, India. He has published more than 11 research papers in reputed journals and attendened 3 International and 1 Nationa conferences.