Proceedings of CHT-15
ICHMT International Symposium on Advances in Computational Heat Transfer

May 25-29, 2015, Rutgers University, Piscataway, USA

CHT-15-023

SIMULATION OF ARRAY OF ROUND JETS IMPINGING ON A MOVING SURFACE UNDER LAMINAR, INTERMITTENT AND TURBULENT CONDITIONS USING A SINGLE MODEL

Phani Krishna Kadiyala[*,§], Himadri Chattopadhyay[**]
[*]Mechanical Engg. Section, MRAGR Govt. Polytechnic, Vizianagaram, INDIA
[**]Dept. of Mechanical Engineering, Jadavpur University, Kolkata, INDIA
[§]Correspondence author Email: kadiyala.phani@gmail.com

ABSTRACT

The present paper reports the effect of surface velocity on heat transfer due to an array of submerged round jets. Transition SST model is used for simulation to predict heat transfer under laminar, transition and turbulent regimes. This model bridges all flow conditions seamlessly. The computational domain considered in this study is a 3D model with symmetric planes on two sides and periodic interface on two sides, so as to assume an array of round jets, the range of Reynolds number is 100 to 5000. Results were first validated with the correlation given by Martin [1977] for array of round nozzles (ARN) under turbulent conditions with an average error of 5.88%. It is observed that at higher surface velocities the heat transfer from the moving surface is more than the case of stationary surface. The value of surface velocity at which the heat transfer from moving surface is minimum decreases with increase in Reynolds number. Using the present model identification of transition regime was possible.

Key Words: Jet Impingement, Array of Round Jets, Transition SST, Moving Surface