

عنوان مقاله:

Enhancement of Heat Transfer over a Double Forward Facing Step with Square Obstacle through Taguchi's Optimization Technique

محل انتشار:

ماهنامه بین المللی مهندسی، دوره 30، شماره 8 (سال: 1396)

تعداد صفحات اصل مقاله: 7

نویسندگان:

M JANANI - School of Mechanical Engineering, SASTRA University, Thanjavur, Tamil Nadu, India

D Prakash - School of Mechanical Engineering, SASTRA University, Thanjavur, Tamil Nadu, India

E Harini, - School of Mechanical Engineering, SASTRA University, Thanjavur, Tamil Nadu, India

T Harish - School of Mechanical Engineering, SASTRA University, Thanjavur, Tamil Nadu, India

خلاصه مقاله:

In this paper, the heat transfer to the fluid, passing through the double forward facing step (FFS) channel with square obstacle is enhanced by Taguchi's S/N ratio analysis. Flow through the forward facing step channel has a wide range of applications in thermal systems due to its flow separation and subsequent reattachment, which in turn enhances the heat transfer. Flow separation and reattachment mainly depends on the channel geometry, obstacle and flow parameters. Hence, in this study, step height in the channel, obstacle size, Reynold's number and gap between the obstacle and step are included as control paramters in the S/N ratio analysis for maximizing the heat transfer. These parameters are varied through three levels of values and L9 orthogonal array is employed. Numerical simulation technique is applied to analyze the L9 cases through computational fluid dynamics code. From the simulation, the rise in temperature at the channel exit with reference to the inlet is predicted. The best values for the identified control parameters conclude to a temperature raise of about 2.86C. The optimum result obtained from the S/N ratio analysis is also compared with response surface methodology technique. Finally, analysis of variance (ANOVA) is conducted .and identified that step height and flow Reynold's number affect the heat transfer by about 79 and 19%, respectively

کلمات کلیدی:

Double Forward Facing Step Flow, Square Obstacle, Taguchi's S/N Ratio Analysis, Response Surface Methodology Technique, ANOVA, Numerical Simulation

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/685732>

