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## Numerical Investigation of Forced Convection Flow over Backward Facing Step Affected By A Baffle Position

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### ABSTRACT

Backward-Facing Step (BFS) flow is one representative model for separation flows, which can be widely seen in aerodynamic flows (airfoil, spoiler, high attack angle process), engine flows, condensers, vehicles (cars, boat), heat transfer systems, and even the flow around buildings, etc. Aiming to enhance the heat transfer characteristics of backward-facing step flow in a channel, three dimensional study of backward-facing step with different baffle's positions under Laminar forced convection flow has been numerically investigated. The range of Reynolds number (from 50 to 400) with water as working fluid have been considered in this study. The governing equations represented by momentum, continuity, and energy equations were solved by employing SIMPLE algorithm with Finite Volume Method to link the velocity and pressure fields. The results revealed that the highest Nusselt number grows near the wall, then transfers further downstream as the position of the baffle moves in the direction of the streamwise. The skin friction increases as the distance between the baffle and the inlet section decreases. Additionally, the maximum Nusselt number and skin friction assigned at (d=40 mm distance of the baffle) meanwhile the minimum Nusselt number and skin friction assigned at channel without baffle. Comparing the results of the cases with or without the installation of baffle, the maximum augmentation on average Nusselt number is about 213% at (d=40 mm distance of the baffle).

#### Keywords:

Backward facing step, Baffle, Heat transfer, Laminar regime

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## 1. Introduction

The separation and reattachment considered one of the most effective methods to improve the thermo-physical phenomena, such as heat transfer using backward-facing step, are employed commonly in various engineering applications such as electrical machines [1-5]. Therefore, the flow over backward facing step technique for heat transfer convection considered interest topics in several investigations. The backward facing step technique is employed widely in much industrial equipment like engines of gas turbine, aircraft and combustors [6-11]. It is noticeable that the flow

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