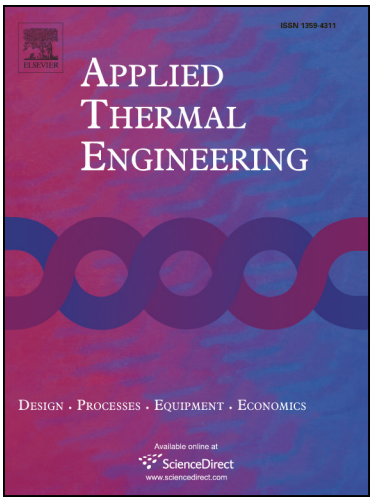

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PII: S1359-4311(17)34097-8
DOI: https://doi.org/10.1016/j.applthermaleng.2018.05.031
Reference: ATE 12170

To appear in: *Applied Thermal Engineering*

Received Date: 17 June 2017
Revised Date: 22 October 2017
Accepted Date: 8 May 2018

Please cite this article as: L. Luo, Q. Chen, W. Du, S. Wang, B. Sundén, X. Zhang, Computational investigation of the dust hole effect on the heat transfer and friction factor characteristics in a U bend channel, *Applied Thermal Engineering* (2018), doi: https://doi.org/10.1016/j.applthermaleng.2018.05.031

Computational investigation of the dust hole effect on the heat transfer and friction factor characteristics in a U bend channel

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Abstract

In this study, effects of a dust hole and its location on the flow structure, endwall heat transfer and friction factor in a U bend channel used for a gas turbine blade tip cooling are numerically studied. The dust hole is placed on the endwall of a U bend at different locations. The U bend channel without dust hole is considered as Baseline. The Reynolds number ranges from 50,000 to 440,000. Results of the flow structure, Nu number, friction factor, and turbulent kinetic energy (TKE) are included. The results showed that the fluid flow entering the U bend channel impinges on the endwall and forms a recirculation vortex. The interaction between the recirculation vortex and pressure gradient caused by the wall generated a rotating vortex pair. This significantly affected the heat transfer. As the dust hole is adopted at the inlet channel near the sidewall, the rotating vortex pair was forced to flow near the endwall and accordingly the shearing effect on the endwall was increased. This consequently

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