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# Experimental Investigation on Film Cooling

## Characteristics of Ellipse-shaped Tab

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**Abstract:** Experimental investigations have been performed to investigate the enhanced film cooling performance caused by ellipse-shaped tabs located at the outlet of the film holes. Specific characteristics of three covering ratios of film holes and four blowing ratios are employed in this experiment and a numerical simulation is also performed to predict the flow fields and verify and to be validated by measured results. Both results showed that the presence of ellipse-tabs was in great decrease of intensity of kidney vortices and the penetration strength of coolant jet into mainstream, in consequence to improve the film cooling effectiveness and heat transfer coefficient than the ones without tabs. Furthermore, a generation of big pressure drop resulting from the ellipse tabs can be observed, resulting in the smaller discharge coefficient of film hole with ellipse tab than without tab.

**Key words:** Turbine machine; ellipse-shaped tab; film cooling; experimental study; numerical simulation

### 1. Introduction

Generally, the advanced gas turbine engines operate at high temperature to improve thermal efficiency and power output. As the turbine inlet temperature increases, the heat transferred to the turbine blades also increases. The level and variation in the

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