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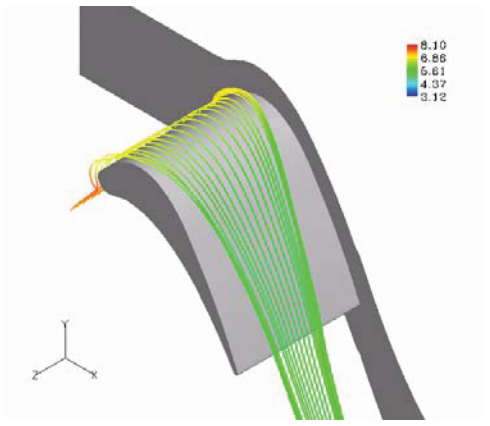
Numerical Analysis of Rotor Blades with and without Film Cooling Holes

Kao, A. F.[1], Tai, C. H.[2] and Miao, J. M.[3]

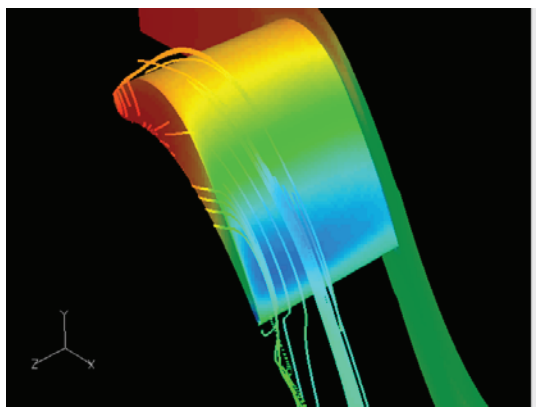
1) Graduate School of Defense Science Studies, Chung Cheng Institute of Technology, National Defense University, Taoyuan, Taiwan, R.O.C., E-mail: g910406@ccit.edu.tw

2) College of Engineering, National Pingtung University of Science and Technology, Pingtung, Taiwan, R.O.C.

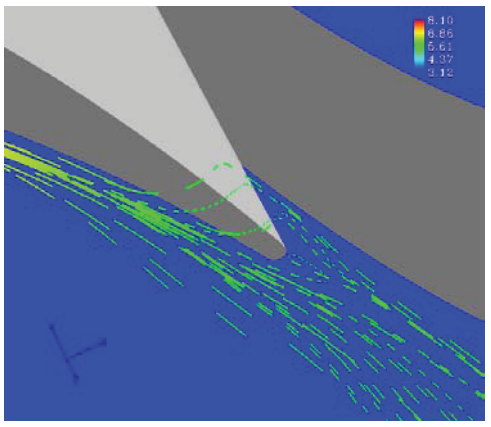
3) Department of Mechanical Engineering, Chung Cheng Institute of Technology, National Defense University, Taoyuan, Taiwan, R.O.C.



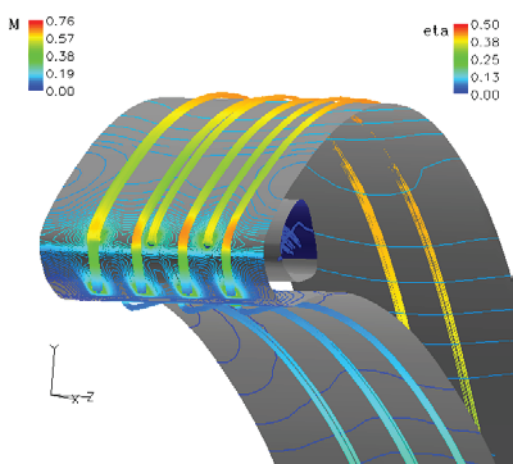
(a)



(b)



(c)



(d)

Figures (a), (b) and (c) show the streamlines of a rotor blade without film cooling holes. Flow conditions are defined as: M_∞=0.3, P_∞=3.294E+5 (Pa), Re=12252, inlet angle of mainstream to blade: 75°. Figure (a) shows the effects of corner vortex and tip vortex. Figure (b) shows the tip vortex system, the blade surface is colored according to pressure, blue representing the low pressure and red representing high. The close-up view of the tip vortex is shown in Fig. (c). Figure (d) shows the flow around the blade with film cooling holes. Coolant is supplied from the internal chamber (the blue area). The contours on blade surface are colored according to adiabatic film cooling effectiveness. The streamlines, seeding on the coolant supply chamber, are colored according to Mach number.