



Wake Distortion in a Turbine Passage

Submitted by

X. Wu and P. A. Durbin, Stanford University

These figures are from a direct numerical simulation of a wake swept across the inlet of a turbine passage. A striking asymmetry between the upper (pressure) and lower (suction) sides of the passage can be seen.

On the pressure side, long vortices emerge within the

flow and descend to the surface; they induce a counter-rotating partner through viscous action, resulting in a vortex pair next to the wall. Although this occurs on a concave surface, these are not Görtler vortices.

On the suction side, turbulence is intensified in the wake and bypass transition is provoked on the blade surface. The asymmetry between the upper and lower parts of the flow is due to the orientation of the wake relative to the rate of strain: The wake is stretched along its axis on the upper side and compressed along its axis on the lower side.