Boundary layer studies over an S-blade

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Double cambered S-blades find applications in turbines and pumps used in tidal power plants and textile machinery. Measurements of aerodynamic characteristics like lift, drag, and lift/drag have been reported by other investigators. To gain a better understanding of the flow over such blades, the velocity profiles and turbulence quantities have been measured on the upper and lower surfaces and are reported in this paper. The flow over the upper surface is subjected to convex curvature first and then to concave curvature, whereas flow on the lower surface encounters the concave surface first and convex later. Small regions of separated flow exist even at zero degree angle of attack. The results are compared with those investigation in which the effects of pressure gradient, curvature, flow separation, and reattachment were studied separately. It is found that for the first half on both surfaces the variation of skin friction coefficient and shape parameter are dominated by the influence of surface curvature. In the last quarter the curvature and pressure gradient have cumulative effect on these parameters. In the third quarter (x/c=0.5 & 0.75) no clear trend is seen as the curvature changes from convex to concave on the upper surface and from concave to convex on the lower surface.

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