On the role of biomimetics shark skin flow control in the Aerodynamic Characteristics of LEP wing section

S.Smrithika , R.Pavithra , S.Arunvinthan*
Department of Aerospace Engineering, SASTRA University, Thanjavur, Tamil Nadu, India.
**arunvinthan@mech.sastra.edu*

ABSTRACT:
An experimental investigation has been conducted to access the effect of shark skin flow control flow control device on the aerodynamic characteristics of novel bio-inspired Leading-Edge Protuberanced (LEP) wing section. Two different configurations of LEP featuring baseline clean wing and modified wing with shark scales were considered in this study. Shark scales were designed using GAMBIT and then 3D-printed for testing. Present study includes the experimental evaluation of these 3D printed shark scales over the test model at different denticle size keeping the patterns constant as linear-overlapped. Reynolds number in the order of 10_5 were considered at wide range of angle of attack ranging from $0° \leq \alpha \leq 25°$ with an increment 5°. Results from linear-overlapped 3D printed denticle pattern reveal that aerodynamic characteristics does not follow the trend. Small sized scale exhibits good drag reduction properties and medium sized scale exhibits good lift increament. Aerodynamic force coefficient and surface pressure measurement of staggered-overlapped and linear-non overlapped will be dealt in detail in full paper.

Keywords: Leading-edge protuberances (LEP), biomimetics, flow control, time-series data, aerodynamic force coefficients, Wind tunnel testing, Surface pressure distribution.