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Study the Effect of Leading-Edge Serration at Owl Wing Feathers on Flow-Induced Noise Generation

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Abstract : During past few decades, being amazed by the excellent silent flight of owl, scientists have been trying to demystify the unique features of its wing feathers. Our present study is dedicated to taking our understanding further on this phenomenon. In this present study, a numerical investigation was performed to analyze how the shape of the leading-edge serration at owl wing feathers effects the flow-induced noise generation. For the analysis, an owl inspired single feather wing model was prepared for both with and without serrations at the leading edge. The serration profiles were taken at different positions of the vane length for a single feather. The broadband noise was studied to quantify the local contribution to the total acoustic power generated by the flow, where the results clearly showed the effect of serrations in reducing the noise generation. It was also clearly visible that the shape of the serration has a very strong influence on noise generation. The frequency spectrum of noise was also analyzed and a strong relation was found between the shape of the serration and the noise generation. It showed that the noise suppression is strongly influenced by the height to length ratio of the serration. With the increase in height to length ratio, the noise suppression is enhanced further.

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