

Abstract Submitted  
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**Optimal aerodynamic design of a wing with bristles** SEUNG HUN LEE, MINHYEONG LEE, DAEGYOUM KIM, KAIST — The smallest flying insects such as a fairyfly or a thrips living in a low Reynolds-number environment have evolved a bristled wing, a wing with several bristles on a thin main frame. Previous studies on the aerodynamic characteristics of a bristled wing have revealed that the gap width and the Reynolds number based on the chord length or the bristle diameter are important parameters that determine the aerodynamic performance of a bristled wing. However, these two important parameters have been treated independently thus far although they are strongly coupled aerodynamically. To examine the combined effects of the gap width and the Reynolds number, we numerically investigate a two-dimensional bristled wing with wide ranges of the gap width and the Reynolds number for a given number of bristles. With some interesting characteristics of viscosity-dominant flow, we introduce a new dimensionless parameter and propose analytic methods to estimate the aerodynamic force generation of a bristled wing for arbitrary Reynolds number and configuration.

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