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Fluid-structure interaction of reticulated porous wings ELIZABETH STRONG, MOHAMMAD JAWED, PEDRO REIS, MIT — Insects of the orders *Neuroptera* and *Hymenoptera* locomote via flapping flight with reticulated wings that have porous structures that confers them with remarkable lightweight characteristics. Yet these porous wings still perform as contiguous plates to provide the necessary aerodynamic lift and drag required for flight. Even though the fluid flow past the bulk of these insects may be in high Reynolds conditions, viscosity can dominate over inertia in the flow through the porous sub-features. Further considering the flexibility of these reticulated wings yields a highly nonlinear fluid-structure interaction problem. We perform a series of dynamically-scaled precision model experiments to gain physical insight into this system. Our experiments are complemented with computer simulations that combine the Discrete Elastic Rods method and a model for the fluid loading that takes into account the 'leakiness' through the porous structure. Our results are anticipated to find applications in micro-air vehicle aerodynamics.

Elizabeth Strong
MIT

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