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Tiny insects clap and fling with flexible wings

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Very small insects that are 1 mm in length or less, such as thrips and fairyflies, often clap their wings together at the end of each upstroke and fling them apart at the beginning of each downstroke. This 'clap and fling' motion augments the lift forces generated during flight, but very large forces are required to clap the wings together and to fling the wings apart. As the opposing forces acting normal to each wing nearly cancel during the fling, these large forces do not have a clear aerodynamic benefit. In this presentation, a standard and an elastic version of the 3D immersed boundary method is used to simulate clap and fling at the low Reynolds numbers characteristic of the smallest insects ($Re < 10$).

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