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**Experimental and Numerical investigations of flapping flight** SIDDHARTH KRITHIVASAN, SANTOSH ANSUMALI, SREENIVAS KR, JNCASR, Bangalore, EMU, JNCASR COLLABORATION — Insects have been observed to produce higher lift than predicted by conventional steady-aerodynamics using a combination of unsteady aerodynamic mechanisms. The wing kinematics and the flow fields produced during flapping flight is essentially 3D. Recently, in our group it has been shown, using flow visualization and 2D simulations, that the asymmetric flapping where, down-stroke is faster than the upstroke, can produce sustained lift. Also by introducing controlled wing flexibility, one can increase the magnitude of the lift. In order to verify these predictions quantitatively we are measuring forces produced by a mechanical flapper using a force-balance. Results of this study will be presented that includes the forces measured in symmetric and asymmetric flapping at different flapping frequencies. Similar understanding of various wing-kinematics during a forward flight can be achieved by doing transient, 3D simulations. A fast, accurate and simple 3D scheme which is capable of dealing with moving boundaries using Lattice Boltzmann has been developed for this purpose. Benchmarking of this scheme has been done for a forward flapping of the wing with elliptical cross-section. The results on the benchmarking and other preliminary results will be presented in the conference.

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