

Bumblebee and Dragonfly Aerodynamics in a Virtual Wind Tunnel

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Introduction

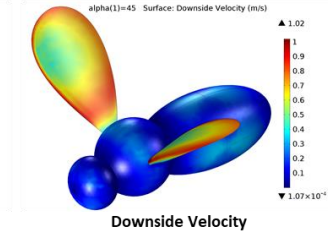
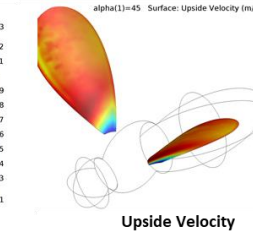
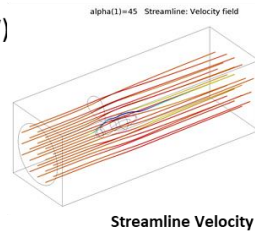
Bird inspired flight helped us to develop intercontinental flying long range aircraft with efficiency as comparable to transcontinental migratory birds. But, short range air travel, efficiency is much lower than short range flying birds and insects. Hence, in this paper, we investigate the flight behaviour of shorts range insects.



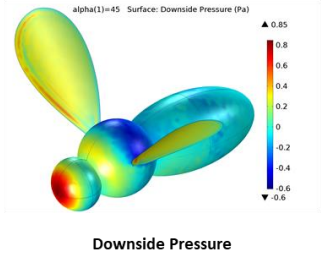
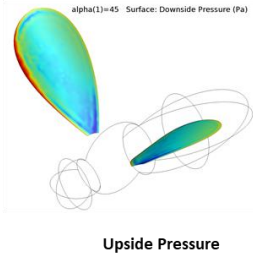
Bumblebee CFD

- Typical CFD results (PV) for up stroke (45 Degree Stroke Angle)

- Velocity stream line of virtual wind tunnel with bumble bee



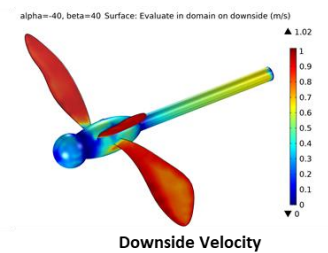
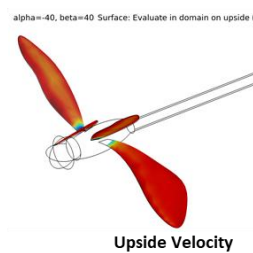
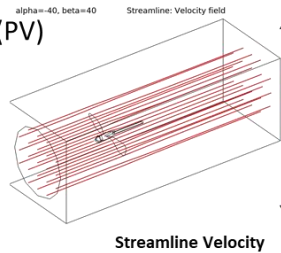
- The velocity and pressure contour plot for upside and downside of bumblebee for up stroke 45°



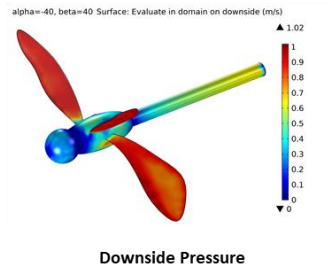
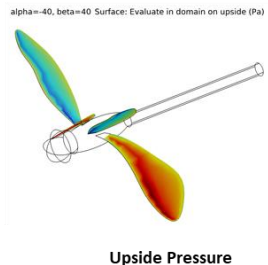
Dragonfly CFD

- Typical CFD results (PV) for foreword up stroke back down stroke

- Velocity stream line of virtual wind tunnel with dragonfly .



- The velocity and Pressure contour plot for upside and downside of Dragonfly for foreword up stroke (40°) , Backward down stroke (-40°)



Conclusion

The computational design investigation and research outcome will be used to design novel personal air transport and short haul air cargo transportation.