

# UNSTEADY LOW-REYNOLDS NUMBER AERODYNAMIC ANALYSIS FOR FLAPPING WING MAV EXECUTING A 3D MOTION

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## Abstract

There is an emerging interest in the field of Nano Aerial Vehicles (NAV) especially of smaller size. These types of vehicles originally developed from the concept of insects, hummingbirds, flying beetles and bats flights. The main objective of this research work is trying to execute a 3D motion (figure of eight) to estimate lift and drag for 3D flapping wing and analysed with the help of computational fluid dynamics, which is related to grid deformation, finite volume method, dynamic mesh and User Defined Function (UDF) for the geometric model with 200mm wing span and 70mm chord. The numerical simulation was carried out at a free stream velocity of 5 m/s. A comprehensive research was carried out to estimate the lift and drag under this condition. The 3D motion helps in better prediction of aerodynamic lift as close to nature and this study is a pointer towards the swarm operations

**Keywords:** Bio-Mimicking, Flow Pattern, Flapping Mechanism, UDF, Computational Fluid Dynamics