

## Comparison of Linear Vortex Lattice Method and Higher Order Panel Method with CFD and Wind Tunnel Data

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### Abstract

In order to evaluate the applicability and efficacy of two distinct induced drag computational techniques based upon linearized, attached potential flow theory, a generic trapezoidal wing is analyzed. These two techniques are extensively utilized in academia and aerospace industry and are founded upon vortex lattice method and higher order panel method respectively. An extended VLM-based technique approximates the three dimensional wing and fuselage into a co-planar geometry. Moreover suction parameter that is calculated analytically, is given as an input to capture three dimensional leading edge thrust and vortex lift effects. On the contrary, the higher order panel method, models the complete geometry. It varies the wake orientation with angle of attack, to better predict the effects of downwash. Both techniques incorporate compressibility effects and therefore are more apt to analyze, both subsonic and supersonic regimes. Due to its wide spread applications in conceptual design and optimization of aircraft geometry, these two methods is compared for accuracy, set-up time and input controllability. Wing geometry with identical boundary conditions, flow parameters and number of panels or networks is examined through both the techniques. The pressure distribution thus obtained is then plotted and results are compared with wind tunnel and CFD data. This comparison concludes the most favorable flow solving technique that better predicts inviscid aerodynamics accurately and efficiently

### Speaker Publications:

1. Observer and descriptor satisfying incremental quadratic constraint for class of chaotic systems and its applications in a quad rotor chaotic system, Aug 2020
2. Financial and Non-Financial Practices Driving Sustainable Firm Performance: Evidence from Banking Sector of Developing Countries, Jul 2020.
3. Thermal performance of micro-polymers containing nano-solid structures during transport phenomenon, Jul 2020.

[2nd International Conference on Aerospace, Defense and Mechanical Engineering](#); Webinar- August 17-18, 2020.

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### Biography:

Tahura Shahid has done her Bachelors in Aerospace Engineering from Institute of Space Technology, Pakistan in 2018. She was awarded with President of Pakistan Gold medal for securing first position in department of Aeronautics and Astronautics. Currently pursuing her career as a design officer at Pakistan Aeronautical Complex, she gained great insight in research and development of aerodynamic flow codes. The challenges she faced in analyzing various methodology for the same problem, motivated her to perform a comparative analysis. She has limited publication in the field but she aim to excel in research and explore the hidden domains of aerodynamics..