

## **Title**

3D vortex panel method solver

## **Participant**

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## **Abstract**

Panel method is renowned method of simulating potential flow across aerodynamic bodies and provides insights into the behavior of flow across a body. It is computationally inexpensive as compared to traditional CFD, which uses complete set of navier stokes equation to solve the fluid flow. We plan on creating vortex panel method solver to simulate potential flow in 3D.

## **Outlines**

1. Creating a panel method solver using crude python programming. This will include the following.
  - a. Panel strength calculation
  - b. Velocit calculation
  - c. Panel influence coefficient calculation
  - d. Linear system solution
  - e. Post processing
2. Code optimization
  - a. Analsis of code bottlenecks using scalene
  - b. Accelerating code performance using numba etc.
  - c. Visualization and user experience

## **Deliverables**

1. Panel method solver, which computes the velocity field around a cylinder and hopeful other bodies, pressure fields, forces, moment, lift and drag .
2. A user interface in which one can tune the input parameters and visualize the result in real-time.
3. Visualization of the velocity and the pressure fields along with the streamlines.

## **Timelines**

1. Crude solver code development: 2nd week of March
2. Code optimization: Till first week of April
3. UI and visulization tool development and bug fixes: Till 3rd week of April