

Cylinder Drag Force Analysis with Real Data

The goal of this project was to calculate total drag on a cylinder by combining real pressure data with a custom skin friction model. Using numerical integration, I separated and calculated both pressure and friction drag to simulate realistic flow behavior.

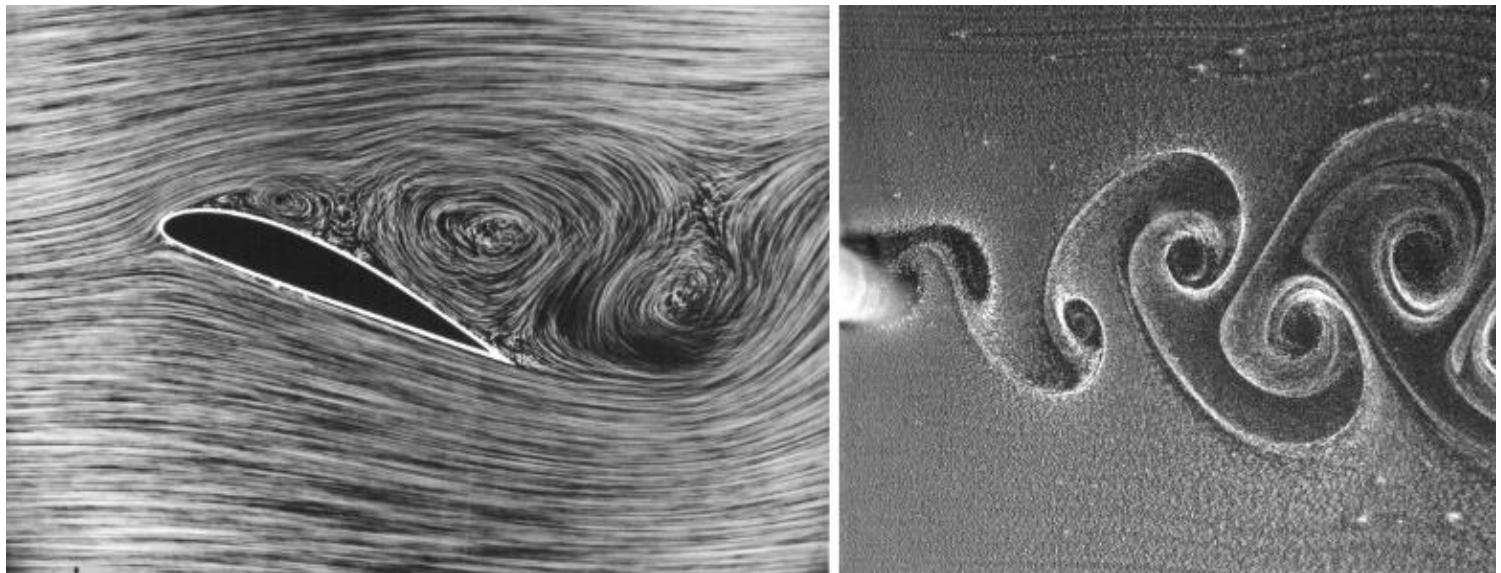


Image Sources: Left: Milton Van Dyke, *An Album of Fluid Motion*, 1983. Right: Sanjay Kumar and George Laughlin, *Revisiting Karman Vortex Street*, APS Division of Fluid Dynamics, 2009.

Technical Details & Skills:

- Processed 100+ experimental data points from a CSV file
- Created multiple graphs to visualize pressure and friction trends
- Modeled skin friction with a custom piecewise polynomial function
- Performed numerical integration to compute drag forces
- Applied fluid dynamics principles, including Reynolds number and drag equations

Outcomes & Contributions:

- Adapted to limited real-world data by implementing a piecewise friction model
- Used numerical integration to accurately compute drag forces
- Created clear visual outputs to communicate pressure and skin friction behavior
- Demonstrated the ability to blend theoretical knowledge with practical computation