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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.

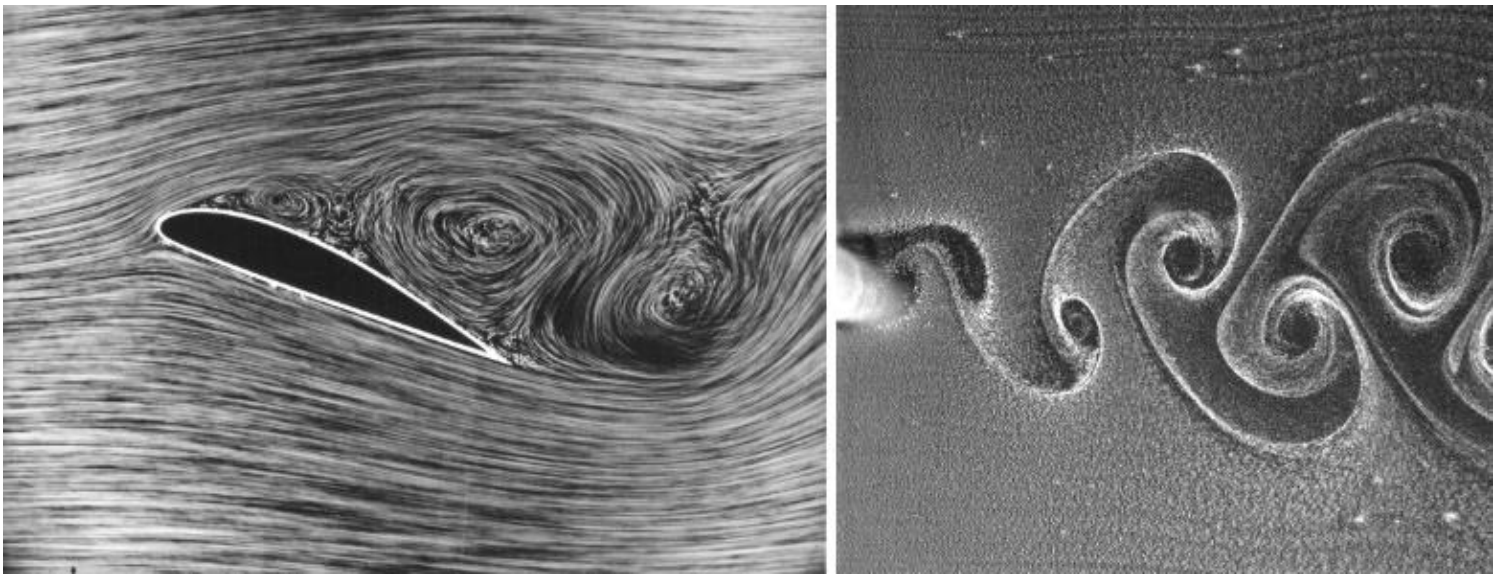

Image Sources: Left: Milton Van Dyke, *An Album of Fluid Motion*, 1983.Right: Sanjay Kumar and George Laughlin, *Revisiting Karman Vortex Street*, APS Division of Fluid Dynamics, 2009.

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