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Experimental Investigation and a Novel Analytical Solution of Turbulent Boundary Layer Flow over a Flat Plate in a Wind Tunnel

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**Highlights**

- The fluid mechanics of incompressible turbulent boundary layers air flow over a flat plate is investigated.
- Thin-Oil-film technique is used to determine skin friction of the plate.
- Reynolds averaged Navier-Stokes equations are normalized by appropriate similarity transformations.
- Variational Iteration Method (VIM) was applied for finding the analytical solution.
- New correlations for skin friction coefficient and boundary layer thickness of turbulent flow over flat plate are proposed.

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