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Accurate Solution of Steady Navier–Stokes System in Unbounded Domains JONATHAN GUSTAFSSON, BARTOSZ PROTAS, McMaster University — A long–term goal of this research is to accurately compute solutions of the steady Navier–Stokes equations in unbounded domains and identify the Euler flows arising as limits when $Re \to \infty$. Motivated by results in the mathematical literature on the "Physically Reasonable" solutions (Finn & Smith, 1967), we ensure our solutions are characterized by a suitable rate of decay at infinity. Since this cannot be achieved in classical CFD methods based on a truncation of the infinite domain to a finite "computational box", we propose an alternative approach in which the Navier–Stokes equation is rewritten as a perturbation to the Oseen equations whose solutions are determined in a semi–analytic form. The resulting problem is discretized using a combination of Fourier–Galerkin and tau–collocation method based on the rational Chebyshev functions. We will present results showing how the wake structure changes with increasing Reynolds number.

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