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Bound on the drag coefficient for flow past a flat plate using the background method[1] ANUJ KUMAR, Department of Applied Mathematics, Baskin School of Engineering, University of California, Santa Cruz — The background method has been a successful tool in finding bounds on mean quantities, such as heat and mass transfer, drag force, and others. Until now, most of the applications of this method focused on flows confined between planar boundaries, such as Rayleigh Bénard convection, Poiseuille flow, and Couette flow. The extension of this method to unconfined flows, such as flow past a sphere, has remained elusive due to a number of mathematical difficulties. In particular, proving bounds on the drag coefficient for flow past an object is an open problem. We will demonstrate that the case of flow past a flat plate avoids some of these difficulties, enabling us to apply the background method to this problem for the first time. We show that at high Reynolds number, the drag coefficient is bounded by a constant. We compare our finding with observations. Finally, we make a few remarks about the issues in using the background method for flow confined between rough boundaries or flow past objects of non-zero volume.

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Anuj Kumar
Dept of Applied Math, Baskin School of Eng, Univ of California, Santa Cruz

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