Abstract Submitted
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The computation of the drag coefficient of the unbounded flow around a circular cylinder in the limit of zero Reynolds number[1] NIKOLAOS MALAMATARIS, George Mason University / ATEI of Thessaloniki, IOANNIS SARRIS, TEI of Athens, DIMITRIOS PAZIS, P2D Engineering Solutions, ANASTASIOS LIAKOS, United States Naval Academy — The behaviour of the drag coefficient in the flow around a circular cylinder in the limit of zero Reynolds number is still unknown. A numerical experiment has been contacted to investigate this behaviour. This experiment is designed like a laboratory set up with tow tank boundary conditions along the top and the bottom of the computational domain. The two dimensional Navier Stokes equations are solved with Galerkin finite elements. It turns out that the domain should very long at the inlet and the transverse direction of the flow, in order for the results to be valid for the unbounded flow. Hence, supercomputing facilities are required, in order to solve the discretized system of equations which is of the order of 50 million unknowns. Results are given of Reynolds numbers ranging from $1 \cdot 10^{-10}$ up to 40., which is the upper limit of the steady state flow conditions for this benchmark. The numerical results are compared with the available experimental measurements in the range of $0.1 \leq Re \leq 40$. The good agreement of our computations with laboratory data add credibility to our investigation in the limit of zero Reynolds number. It is the first time that a code produces results for this flow in such a wide range of values.

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