Low Reynolds Number Flow Over a Square Cylinder with a Detached Flat Plate

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Synopsis

This research migration project aims to do numerical simulations of the alteration of a square cylinder wake using a detached downstream thin flat plate using OpenFOAM . The geometry and mesh were defined using blockMesh utility. A simulation uses a transient incompressible solver, pisoFoam to simulate the flow over a square cylinder with detached flat plate. The wake is created by a uniform flow with a Reynolds number of 150 based on the cylinder's side length, D. By altering the gap distance (G) along the wake centerline in the range $0 \leq G \leq 7D$ for a constant plate length of $L = D$, the sensitivity of the near wake structure to the downstream position of the plate is explored. A condition where significant unstable total lift reduction can occur is obtained by adjusting the plate length and gap spacing.
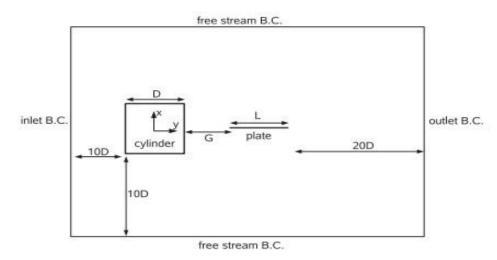
Figure No 1: Flow domain for a square cylinder with a splitter plate [1]

References

[1] Mohamed Sukri Mat Ali , Con J. Doolan, Vincent Wheatley, "Low Reynolds number flow over a square cylinder with a detached flat plate" , International Journal of Heat and Fluid Flow 36 (2012) 133–141, http://dx.doi.org/10.1016/j.ijheatfluidflow.2012.03.011