

A NUMERICAL SOLUTION OF THE INITIAL FLOW GENERATED  
BY COMBINED (2-DoF) RECTILINEAR AND ROTATIONAL  
CYLINDER OSCILLATION

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A numerical study is presented for the initial flow of two-dimensional viscous incompressible flow past a circular cylinder forced to oscillate in Two-Degree-of-Freedom (2-DoF) rectilinear and rotational cylinder oscillation. A perturbation theory is implemented to capture the development of the physical properties of the flow at early times. The results are conducted at different values of Reynolds number  $R = 100 - \infty$ ; displacement amplitude-to-cylinder radius ratios of  $A = 0.2 - 1.0$  and the forcing frequency values  $f$  are chosen from 0.05 to 0.4. Comparisons with existing results verify the accuracy of the present results.