

CFD Analysis of Free-Falling Disks Using Overset Mesh Techniques

Duruseti Srijia¹, Chandan Bose², and Nikhil Chitnavis³

¹Department of Mechanical Engineering, Indian Institute of Technology Kanpur, Kanpur, India

²Assistant Professor, Department of Aerospace Engineering, University of Birmingham, Birmingham, United Kingdom

³Ph.D. Research Scholar, Indian Institute of Technology Madras, Chennai, India

Abstract

This study presented a numerical investigation of freely falling solid and annular disks using overset mesh techniques in OpenFOAM. Three-dimensional transient simulations were performed under laminar flow conditions using six-degree-of-freedom (6-DoF) rigid-body motion. The study focused on the influence of body geometry on downstream flow behavior during steady free fall in the low Reynolds number regime. Comparisons between the solid and annular disks showed that the central opening in the annular geometry modified the downstream flow structure and streamline distribution. The results demonstrated the capability of overset mesh methods for moving-body simulations involving freely falling bluff bodies.

Keywords: CFD, Overset Mesh, OpenFOAM, 6-DoF Motion, Free-Falling Disk

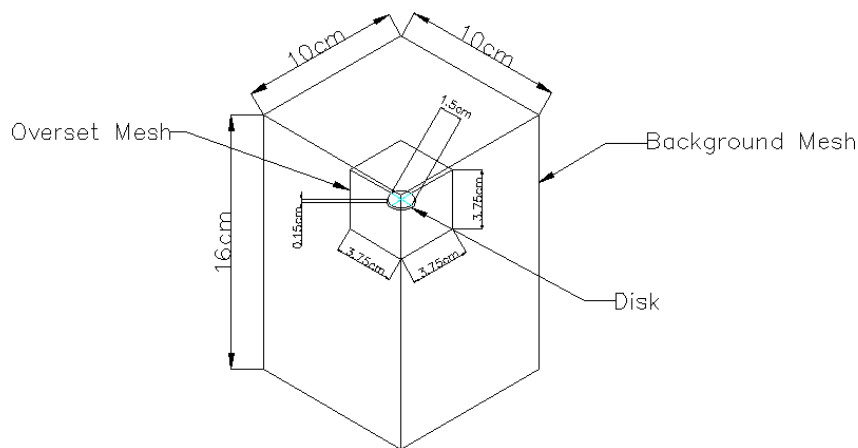


Figure 1: Solid disk and annular disk geometries used in the present study