

CFD Analysis of Free-Falling Disks Using Overset Mesh Techniques

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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

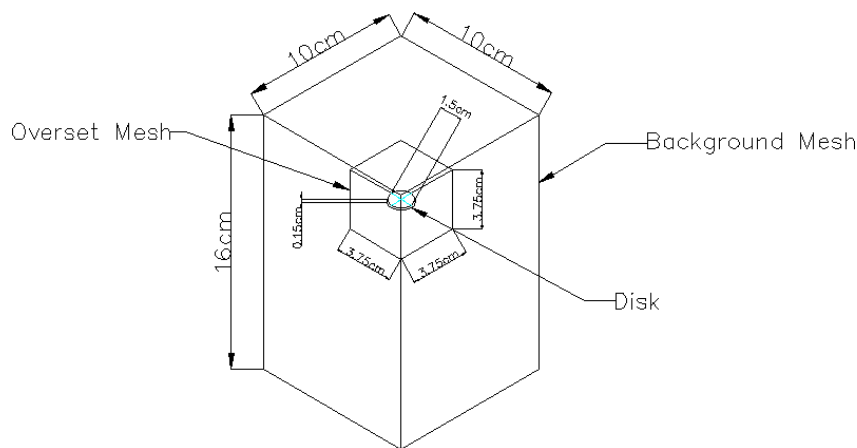


Figure 1: Solid disk and annular disk geometries used in the present study