

## Viscous Flow Computations for the Diffuser Section of a Large Cavitation Tunnel

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**Abstract :** The present paper covers the viscous flow computations for the asymmetric diffuser section of a large, high-speed cavitation tunnel which will be constructed in Istanbul Technical University. The analyses were carried out by using the incompressible Reynold-Averaged-Navier-Stokes equations. While determining the diffuser geometry, a high quality, separation-free flow field with minimum energy loses was particularly aimed. The expansion angle has a critical role on the diffuser hydrodynamic performance. In order obtain a relatively short diffuser length, due to the constructive limitations, and hydrodynamic energy effectiveness, three diffuser sections with varying expansion angles for side and bottom walls were considered. A systematic study was performed to determine the most effective diffuser configuration. The results revealed that the inlet condition of the diffuser greatly affects its flow field. The inclusion of the contraction section in the computations substantially modified the flow topology in the diffuser. The effect of the diffuser flow on the test section flow characteristics was clearly observed. The influence of the introduction of small chamfers at the corners of the diffuser geometry is also presented.

**Keywords :** asymmetric diffuser, diffuser design, cavitation tunnel, viscous flow, computational fluid dynamics (CFD), rans

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