Verification type	Numerical Solution
Database reference	NUM-2
Topic / Application	Hydrogen release, Nuclear
Physics	Momentum, diffusion release, stratification
Summary	Verification of numerical modelling approach to LOWMA-3 experiment at MISTRA facility via two CFD codes
Description	This paper undertakes verification of two CFD codes which are used to model the LOWMA-3 experiment performed at the MISTRA facility at CEA, France. A key aspect of this experiment is that momentum transport and molecular diffusion contribute equally to the diffusion process i.e. Fr ≈ 1. The practical application of the experiment is hydrogen release during nuclear containment scenarios. While most of the paper deals with appropriate model choice and hence is validation, the authors compare the modelling results of two codes – a commercial code (Fluent) and an in-house code (Trio-U). The authors believe that the staggered mesh arrangement (for storing field variables) is better able numerically to deal with velocity/pressure coupling and concentration stratification. The paper also utilises best practice guidelines for CFD in Nuclear Reactor Safety.
Case Title	SIMULATION OF LOWMA-3 MISTRA EXPERIMENT
Authors	*Ishay L., Ziskind G. and Rashkovan A, Bieder U. and Brinster J*
Year	2012
Online reference	ulrich.bieder@cea.fr

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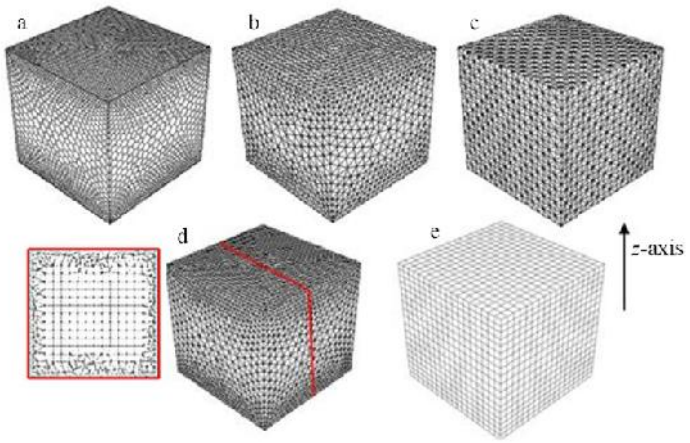
Case image	 Spurious velocity and mesh dependence study
Governing equations	N/A
Results	The paper reports on poor accuracy resulting from mesh topologies, and from discretisation / interpolation schemes. A key insight is that spurious velocities arising from mesh topologies and poor mesh quality can be of the order of diffusion velocities and where Fr ≈ 1 this will lead to poor accuracy. Tetrahedral meshes show poor representation of diffusion due to cell faces being unaligned with concentration and buoyancy gradients. The paper follows a good process for verification in separating the separate mixing effects before combining them into a single model. The rationale behind the chosen modelling approach, including mesh topology, turbulence modelling and various numerical parameters, has been established based on the separate effect studies.

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