

Abstract Submitted
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Large-eddy simulations of stratification layer erosion by a jet¹

ALEKSANDR OBABKO, ELIA MERZARI, Argonne National Laboratory, ANANIAS TOMBOULIDES, Aristotle University of Thessaloniki, Greece, SHASHI AITHAL, PAUL FISCHER², Argonne National Laboratory — Following Fukushima disaster, the OECD/NEA has chosen the PANDA experiment for 2014 benchmark exercise where predictive capabilities of computational fluid dynamics (CFD) tools are tested for multispecies convection in notorious regime of transition from turbulent to laminar flow and from forced to natural convection. Accurate prediction of these phenomena will be beneficial for a range of applications including reactor thermal-hydraulics where it will further our understanding of reactor behavior during accidents and help design safer and more efficient reactors for a carbon-free energy option. In fact, the convection and mixing flow in the containment played an important role in the Fukushima accident as the buoyant hydrogen gas mixed with oxygen and detonated resulting in significant destruction and radioactive pollution. Here we present the three-dimensional large-eddy (LES) simulations of the PANDA experiment with the spectral-element open-source code Nek5000. The results are compared and contrasted for a range of parameters using Boussinesq and low-Mach number approximations.

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²also University of Illinois at Urbana-Champaign

Aleksandr Obabko
Argonne National Laboratory

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