

Overview of Multiscale Fuels and Materials Modeling within the US DOE-NE NEAMS Program

C.R. Stanek

Los Alamos National Laboratory, Los Alamos, NM, USA

The U.S. Department of Energy Office of Nuclear Energy program NEAMS (Nuclear Energy Advanced Modeling and Simulation) is a multi-national lab team effort aiming to develop and deploy predictive computer methods for the analysis and design of advanced nuclear reactors (i.e. non-LWRs). A current emphasis of the NEAMS program is achieving an optimal balance between early stage R&D activities and more applied industrially relevant efforts. Given (1) an increased maturity level of several capabilities (including the BISON fuel performance code) and (2) a surge in advanced reactor start up industry, a natural pivot from emphasis on early stage R&D to a balanced effort including applications is occurring. A key element of the program since its inception nearly a decade ago is multiscale fuel performance. However, a more recent development is the establishment of a focused structural materials effort, which is motivated by the need to understand the behavior of structural components in complex environments present in advanced reactors. In this presentation, an overview of recent activities in the NEAMS program in the area of fuel modeling of advanced reactor fuel will be presented. In addition, efforts in the area of structural materials modeling, especially for high temperature applications in radiation fields and potentially with complex chemical environments, will be presented.