NE-21-25129, Multiphysics Design Optimization and Additive Manufacturing of Nuclear Components

Westinghouse Electric Company (Westinghouse), a nuclear power company based in Cranberry Township, Pennsylvania, is developing new designs to support advanced fuel products and advanced reactors. Westinghouse aims to develop the best designs with the aid of advanced manufacturing methods to produce results in improved performance and economics.

To help develop this generic design and manufacturing optimization process, Westinghouse selected the nuclear fuel spacer grid as an example for this effort (even though the process may be applicable to any nuclear component). The spacer grid was selected because it is a challenging part for optimization involving multiple types of physics.

Westinghouse and Oak Ridge National Laboratory will use multiphysics design optimization methods and additive manufacturing to help develop new nuclear components as well as optimized replacements to existing components that are optimum for meeting design requirements and are manufacturable. Some of the design optimization methods include topology optimization, generative design, and other state of the art multiphysics optimization algorithms. This work will help Westinghouse and the nuclear industry develop a generic process for design optimization and manufacturing that improves overall nuclear plant performance and cost efficiency.