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Simulation of U-Mo Full-Size Fuel Plates – Recent DART-2D Enhancements

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ABSTRACT

Recently, the DART-2D computational code has undergone significant development. Two major enhancements have been implemented. First, the code has been parallelized to operate on parallel computer processors in order to facilitate full-size plate simulation using a rate-theory-based fission gas behavior model – the GRASS module, and second, a separate calculation route for monolithic fuel simulation has been added to the code. These enhancements lay a solid foundation for future fuel performance evaluation and simulation activities; for example realistic simulation of the irradiation behavior of full-size fuel plates in high power research reactors. Parallelization of the code is crucial in order to perform the calculations using the computation-intensive GRASS module for large-scale simulations (hundreds of nodes). This enhancement enables DART-2D to simulate the irradiation behavior of full-size fuel plates without compromising the important model details impacting the microstructural changes during irradiation, such as gas bubble formation and growth, and grain subdivision. At the same time, creating a separate calculation route for monolithic fuel simulations is highly desirable as it will allow the code to handle the specific configurations of monolithic fuels, which in turn improves the accuracy of monolithic fuel behavior simulation.