

REPRODUCIBILITY OF FLUX AND FLUENCE LEVELS IN NUCLEAR THERMAL TESTING

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ABSTRACT

For nuclear thermal testing different types of simulation facilities are available. Lab simulators with xenon lamps and solar furnaces are preferred to run small scale tests on equipment or to compare the thermal radiation resistance of different materials. Only these facilities offer the possibility to simulate the real pulse shape and spectrum of a nuclear thermal flash. For large equipment or full scale testing of whole weapon systems the only adequate facility to run a simulated nuclear thermal radiation test is a free field thermal radiation simulator (TRS), which produces the thermal radiation by the combustion of aluminum powder and liquid oxygen.

Modernization of the computer control system for the large nuclear heat flash lab facility of the WIS in Munster required the investigation of the reproducibility of flux and fluence levels. Thus results of different simulated weapon yields were compared to the reproducibility of the former control system. In addition reproducibility was compared to the results obtained on the French solar furnace, the German four burner TRS and the small thermal radiation lab facility of the WIS. For that analysis the irradiation parameters of more than 400 heating pulses were evaluated. Results show that the reproducibility of thermal tests on xenon lamp lab facilities or on solar furnaces is better than the reproducibility of TRS testing.