

IAF SPACE PROPULSION SYMPOSIUM (C4)  
Joint Session on Advanced and Nuclear Power and Propulsion Systems (10-C3.5)

Author: Mr. Michael Joyce  
The Ohio State University College of Engineering, United States, joyce.247@osu.edu

STRUCTURAL INTEGRITY OF NUCLEAR FUEL RODS DURING EARTH-TO-ORBIT LAUNCH

**Abstract**

This research focuses on ongoing work into the effects of forces acting on inactive nuclear fuel rods during launch. Much research has gone into studying thermal stresses on nuclear fuel rods while active in a nuclear thermal propulsion engine; however, there have been no tests on the mechanical stresses the fuel rods will endure during the initial launch from Earth before they are in use. As part of my research, I am investigating nuclear fuel rod designs used by the previous Nuclear Engine for Rocket Vehicle Application (NERVA) program and BWXT who is contracted to build an engine for NASA. A finite element analysis will be used on these fuel rod designs to model if any fractures or cracking will result from the acceleration and vibrational forces of a launch. Physical tests will then be conducted on prototype rods made from a non-nuclear material with similar properties to uranium and will include a launch in a rocket from the university's rocket club.