

技术及应用

核爆炸装置热力学研究

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收稿日期 修回日期 网络版发布日期:

摘要 为研究放热材料释放的热能对核爆炸装置力学性能的影响, 采用公开资料, 对核爆炸装置进行热力学分析。通过级联衰变动力学计算得到每千克武器级钚、武器级铀及贫化铀的放热功率, 并对仿真结果进行拟合分析; 选取其最大值对Steve Fetter提出的公开核装置假想模型进行温度场数值仿真; 根据工业生产实际对Steve Fetter提出的公开核爆炸装置假想模型进行修订, 并对其进行热应力仿真分析。结果表明: Steve Fetter提出的4种核爆炸装置的热力学性能极差, 不能在现实中存在。

关键词 [核爆炸装置](#) [放热功率](#) [温度场](#) [数值仿真](#) [热力学分析](#)

分类号

Thermal Dynamics Study of Nuclear Explosive Device

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Abstract In order to find the thermal dynamical effect of the exothermic materials on the mechanical capability of the nuclear explosive device, the thermal physics analysis of the nuclear explosive [JP2]device with public hypothetic models was done. The heat producing power of weapon grade plutonium (WgPu), weapon grade uranium (WgU) and depleted uranium (DU) per kilogram were calculated through simulation and dynamic decay cascade, the regression line was fitted and analyzed. The temperature fields of the nuclear explosive device raised by Steve Fetter were analyzed according to the simulation results of the heat producing power of the exothermic materials. The hypothetical models of the nuclear explosive device were modified according to the normal disposal method in industry manufacture, and thermal stress distribution was simulated with the information processed before. The results show that the thermal dynamic properties of the four types of hypothetic nuclear explosive models raised by Steve Fetter are very bad, so they can't exist in reality.

Key words [nuclear explosive device](#) [heat-producing power](#) [temperature field](#) [numerical simulation](#) [thermal dynamics analysis](#)

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