



航空学报 » 2012, Vol. 33 » Issue (7) : 1181-1188 DOI:

流体力学与飞行力学

最新目录 | 下期目录 | 过刊浏览 | 高级检索

<< << 前一篇 | 后一篇 >> >>

## 射弹高速打击下油箱空腔动力学研究

蔡海亮, 宋笔锋, 裴扬, 王刚

西北工业大学 航空学院, 陕西 西安 710072

## Cavity Dynamics Study of Fuel Tank Impacted by High-speed Projectile

CAI Hailiang, SONG Bifeng, PEI Yang, WANG Gang

College of Aeronautics, Northwestern Polytechnical University, Xi'an 710072, China

摘要

参考文献

相关文章

Download: [PDF \(4237KB\)](#) [HTML 1KB](#) Export: [BibTeX](#) or [EndNote \(RIS\)](#) [Supporting Info](#)

摘要 为了确定高速射弹击穿飞机油箱后干舱起火的时间和燃油的泄漏流速,需要对射弹穿入燃油引起的空腔形成和崩塌过程进行分析,确定空腔的崩塌完成时间和空腔内的压力。建立了用于模拟高速射弹侵入燃油后空腔形成和崩塌的解析模型和数值模型,分析了射弹速度衰减引起的动能损失和空腔形成所需的能量之间的转换过程,定量计算了空腔内压力以及空腔崩塌完成时间和位置。研究表明:对于给定形状和尺寸的射弹,在空腔形成和崩塌期间,空腔内的压力和空腔崩塌完成时间变化较小,与射弹速度无关近似为常数;空腔初始崩塌的位置与撞击速度之间存在弱相关性。

关键词: 油箱 干舱 撞击 空腔 射弹

Abstract: In order to determine the time of the dry bay ignition and the leak speed of fuel after an aircraft is impacted by a high-speed projectile, it is necessary to analyze the cavity formation and collapse induced by high-speed impact and penetration of a rigid projectile into the fuel tank, and determine the cavity collapse completion time and pressure. For simulating the process of the cavity formation and collapse induced by high-speed projectile penetrating into the fuel tank, an analytical model and a numerical model are founded in this paper. It analyzes the energy transfer for cavity formation and the energy dissipated by the velocity-dependent drag on the projectile, and calculates pressure in the cavity, cavity collapse completion time and location. The results show that the pressure in the cavity and the cavity collapse completion time are almost constant and independent of the impact velocity for a given projectile, and that the collapse initial location is a weak function of the impact velocity.

Keywords: fuel tank dry bay impact cavity projectile

Received 2011-10-08;

Fund: 国家自然科学基金 (11102159); 西北工业大学基础研究基金(NPU-FFR-JC20100221)

Corresponding Authors: 裴扬, Tel.: 029-88495914 E-mail: peiyang\_yang@nwpu.edu.cn Email:

peiyang\_yang@nwpu.edu.cn

引用本文:

蔡海亮, 宋笔锋, 裴扬, 王刚. 射弹高速打击下油箱空腔动力学研究[J]. 航空学报, 2012, 33(7): 1181-1188.

CAI Hailiang, SONG Bifeng, PEI Yang, WANG Gang. Cavity Dynamics Study of Fuel Tank Impacted by High-speed Projectile[J]. Acta Aeronautica et Astronautica Sinica, 2012, 33(7): 1181-1188.

### Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

### 作者相关文章

- ▶ 蔡海亮
- ▶ 宋笔锋
- ▶ 裴扬
- ▶ 王刚

