[1]张荣理,何立明,荣康,等.喷口与凹面腔距离L对激波聚焦起爆爆震波的影响分析[J].弹箭与制导学报,2012,2:137-140.

ZHANG Rongli,HE Liming,RONG Kang,et al.The Investigation on the Influence of Distance between Jet Inlet and ConcaveExit Plane on Detonation Initiation by Shock Wave Focusing[J].,2012,2:137-140.

点击复制

喷口与凹面腔距离L对激波聚焦起爆爆震波的影响分

《弹箭与制导学报》[ISSN:1673-9728/CN:61-1234/TJ] 期数: 2012年第2期 页码: 137-140 栏目: 火箭技术 出版日期: 2012-04-25

Title: The Investigation on the Influence of Distance between Jet Inlet and Concave Exit Plane on Detonation Initiation by Shock Wave Focusing

作者: 张荣理; 何立明; 荣康; 陈鑫; 曾昊
空军工程大学工程学院，西安710038

Author(s): ZHANG Rongli ; HE Liming; RONG Kang; CHEN Xin; ZENG Hao
The Engineering Institute, Air Force Engineering University, Xi an 710038,China

关键词: 环形喷口与凹面腔距离; 激波聚焦; 数值模拟

Keywords: distance between jet inlet and concave exit plane; shock wave focusing; numerical simulation

分类号: V211.3

DOI: -

文献标识码: A

摘要: 为研究两级脉冲爆震发动机环形喷口与凹面腔距离 L对激波聚焦起爆爆震波的影响，文中以氢气和空气混合物为例，对不同L下激波聚焦起爆爆震波的过程进行了数值模拟。结果表明，L的存在会使激波入射方向与壁面法线方向夹角减小，在壁面反射聚焦的激波面积增大，腔内的反射聚焦效应增强；随着L的增大，起爆点与壁面间距离增加，起爆点压力下降；在L=1d附近，一个爆震循环作用于单位面积壁面的冲量最大。

Abstract: In order to investigate the influence of the distance between jet inlet and concave exit plane on detonation initiation via shock wave focusing in a 2 stage PDE, detonation initiation with different L (the distance between jet inlet and concave exit plane) was simulated and hydrogen air mixture was used in this paper. The results indicate that in the hemisphere concave cavity, the appropriate length of L can improve the incidence of leading shock at the concave wall to increase the reflected shock wave area and Aprrease the incidence angle and thus improve the reflecting effect. As L increases, the distance between the focus and concave wall is enlarged. Further more, when L =1d,the impulse on unit concave area is the largest during a detonation cycle.

参考文献/REFERENCES

[1]Roy G D, Frolov S M, Borisov A A, et al Pulsed detonation propulsion: challenges, current status, and future perspective [J] .Progress in Energy and Combustion Science, 2004,30(6):545-672.
[2]Levin V A, Nechaev J N, Tarasov A I A new approach to organizing operation cycles in pulse detonation

engines,ADA406683[R].
[3]Ivett A Leyva，Venkat Tangirala，Anthony J Dean.Investigation of unsteady flow field in a 2-Stage PDE resonator，AIAA 2003 0715[R] 2003.
[4]Keith R McManus,Anthony J Dean. Experimental evaluation of a two stage pulse detonation combustor，AIAA-2005-3773[R] 2005.
[5]王栋· 脉冲爆震发动机工作过程数值模拟研究[D]· 南京：南京理工大学，2007.
[6]姜日红，武晓松，王栋· 共振型PDE谐振腔喷嘴匹配关系研究[J]· 航空动力学报，2009，24（5）:56-60.
[7]李海鹏，何立明,陈鑫，等· 不同结构形式凹面腔内的激波聚焦起爆爆震波数值研究[C]//第九届全国冲击动力学学术会议,2009.
[8]李海鹏，何立明，陈鑫，等 凹面腔内激波聚焦起爆爆震波过程的数值模拟[J]· 推进技术，2010，31（1）：87-91.
[9]KONNOV A A. Refinement of the kinetic mechanism of hydrogen combustion[J]. Khimicheskaya Fizika,2004,23 (8): 5-18.
[10]KONNOV A A. Remaining uncertainties in the kinetic mechanism of hydrogen combustion[J]. Combust. Flame,2008,152 (4): 507-528
[11]Achasov O V, Penyazkov O G.Some gasdynamic method for control of detonation initiation and propagation,AIAA 2001-3614[R] 2001

备注/Memo: 收稿日期：2011-05-27 作者简介：张荣理（1988-），男，安徽阜阳人，硕士研究生，研究方向：信息系统与决策支持系统。

更新日期/Last Update: 2012-04-25