

SPACE PROPULSION SYMPOSIUM (C4)
Hypersonic and Combined Cycle Propulsion (5)

Author: Dr. Xi Wenxiong

Science and Technology on Scramjet Laboratory, National University of Defense Technology, China,
13739076081@163.com

Prof. Wang Zhenguo

China, wangzhenguo@sina.com

Dr. Sun Mingbo

China, wind_flowefd@163.com

Dr. Jianhan Liang

National University of Defense Technology, China, jhleon@sina.com

EFFECT OF PRE-COMBUSTION SHOCK TRAIN ON FUEL INJECTION AND DISTRIBUTION IN
SCRAMJET

Abstract

Effect of pre-combustion shock train on fuel injection and distribution in scramjet was experimentally investigated. Experiments were performed with an isolator entrance Mach number of 2.5 and air stagnation temperature of 1200K. High speed camera and schlieren photography were equipped to record the dynamic process of liquid fuel injection and shock evolution. The two kinds of shock structure respectively pre-combustion shock wave induced by combustion heat release downstream and incident shock wave induced by flow blockage of physical strut were compared and discussed. Results show that the two proposed methods above can generate the similar shock train structure in shape but differ in their effect of fuel injection and evaporation. The former produced by increasing the back-pressure due to heat release has great effect on fuel injection and evaporation. The latter just affect the local behaviour at the position of injection.