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低于自启动马赫数时高超进气道的非正常流动特性

Unsteady characteristics of hypersonic inlet below self-starting Mach number

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中文关键词: [流场振荡](#) [非正常](#) [流场特性](#) [高超声速进气道](#) [数值仿真](#)

英文关键词: [flow oscillation](#) [unsteady](#) [flow characteristics](#) [hypersonic inlet](#) [numerical simulation](#)

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中文摘要:

采用非正常数值仿真的方法研究了低于自启动马赫数时高超声速进气道的非正常流动特性. 研究表明: 低于进气道自启动马赫数时, 进气道处于不起动状态, 流场发生喉道阻塞性振荡现象, 其流场振荡频率为250Hz. 流场振荡主要发生在喉道之前, 对其后流场影响相对较小, 扰动信号由喉道以当地气流速度向下游传播. 隔离段长度对喉道阻塞性流场振荡几乎没有影响. 飞行马赫数较小时流场未出现振荡现象, 当飞行马赫数靠近自启动马赫数时流场出现周期性振荡现象, 并且随着飞行马赫数的增大, 此类流场振荡趋于强烈; 进气道压差阻力随着时间推进呈现周期性变化, 振荡频率同样为250Hz.

英文摘要:

The unsteady characteristics of a hypersonic mixed-compression inlet below the self-starting Mach number were numerically studied. The results show that the inlet works at un-starting mode, and oscillation phenomenon of the flow in the inlet appears with a frequency of about 250Hz. The flow oscillation occurs primarily in front of the throat and attenuates downstream the throat. The disturbance propagates downstream from the throat with the speed of the flow. The ratio of the length to height of the isolator has no effect on the flow oscillation, but the Mach number of the freestream affects the flow oscillation greatly. With the freestream Mach number approaching to the self-starting Mach number, the flow oscillation becomes more and more intense, but the flowfield retains steady when the freestream Mach number is too low. The pressure drag of the inlet also fluctuates periodically with the frequency of about 250Hz.

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