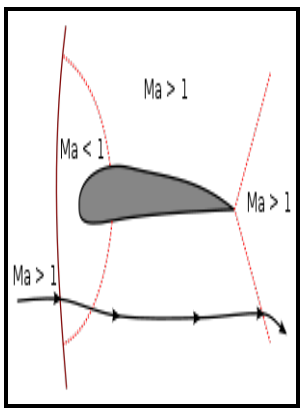
Conical flow parameters for air in dissociation equilibrium

General Dynamics Corporation, Convair Division - Supersonic flow past a sharp cone oscillating about a zero angle of attack



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State

Recently, lots of research has been done to advance the heat recovery process of an ammonia synthesis system in the context of ammonia-based solar thermochemical energy storage. Different contributions to the heat flux are evaluated and a satisfactory agreement with experiments is shown. Aircraft aerodynamics properties were calculated for cases of perfect gas and non-equilibrium flow.

Chemistry Models for Air Dissociation

Definition of hypersonic flow regime: Definition of flow regime is based on the Mach number of the flow.

Chemistry Models for Air Dissociation

As a result of all these reactions, hypersonic vehicle gets engulfed by reacting boundary layer and high temperature plasma.

IHS ESDU: Aerodynamics

From the relations between shock angle, Mach number and flow deflection angle or wedge angle, it would be clear that, for same flow deflection angle, shock angle decreases with increase in Mach number.

Numerical analysis of air dissociation influence on spaceplane aerodynamic characteristics

Therefore two types of assumptions are generally made about the flow conditions for high temperature fluid as equilibrium flow and non-equilibrium flow.

IHS ESDU: Aerodynamics

Flight parameters like pitch, roll, drag, lift, defection of control surfaces get largely deviated from their usual estimate of calorically perfect gas. The pitch moment coefficient related to the angular velocity of vibration is determined.

IHS ESDU: Aerodynamics

Viscous dissipation leads to increase in boundary layer thickness due to increase in viscosity coefficient with temperature.

Supersonic flow past a sharp cone oscillating about a zero angle of attack

Therefore treatment of air or any fluid flowing with hypersonic speed over any configuration should be done properly by incorporating all the microscopic changes which essentially leads to change in thermodynamic properties with temperature. Physics of Fluids 2020, 32 9 , 096101.

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