NOMENCLATURES

C_p	-specific heat at constant pressure, *kJ/kg^oC*
C_v	-specific heat at constant volume, *kJ/kg^oC*
D	-diameter of the base body, *mm*
H	-total enthalpy (=$h+V^2/2$), *J/Kg*
e	-internal energy, , *J/Kg*
E	- total energy per unit volume of the fluid
f	-body force per unit mass
f_x, f_y, f_z	-Component of body force per unit mass in a Cartesian system
$\overline{f}$	-time averaging
G_v	- production of turbulent viscosity
K	- coefficient of thermal conductivity, *W/m-K*
l	-overall length of aerospike, *mm*
l_1	-length of first aerospike, *mm*
l_2	-length of second aerospike, *mm*
l_3	-length of third aerospike, *mm*
l'	- $l_2+ l_3$, *mm*
l/D	-ratio of total length of the aerospike to the diameter of the base
L	-overall length of the base body , *mm*
M	Mach Number
P	-local surface pressure, *N/m^2*
P_{inf}	-free stream pressure, *N/m^2*
Pr	-Prandtl Number, *($\mu/C_p/K$)*
q	-wall heat transfer rate, *W/m^2*
q_0	-wall heat transfer rate of the base body ,*W/m^2*
Q	-total heat transfer rate, $\int qdA$ *W*

Q_0 -total heat transfer rate of the base body, $\int qdA\ W$

q -heat flux vector

Q -external heat addition per unit volume

r_1 -radius of first aerospike, *mm*

r_2 -radius of second aerospike, *mm*

r_3 -radius of third aerospike, *mm*

R -Universal gas constant =*8314 J/Kg.mol K*

T -temperature, *K*

S -mean strain tensor

u -x-component of velocity, *m/s*

v -y-component of velocity, *m/s*

w -z-component of velocity, *m/s*

V -velocity vector, *m/s*

-shear stress, *Pa*

π_{ij} -Stress tensor - consist of normal and shearing stresses, *Pa*

δ_{ij} -kronecker delta function

μ -dynamic viscosity, *Pa-s*

μ' -second coefficient of viscosity, *Kg/m-s*

∇ - vector differential operator

Φ -dissipation function

ν_t -characteristic velocity of the turbulence

y^+ -non-dimensional distance used in turbulent flow

Y_ν - destruction of turbulent viscosity

Ψ -inviscid flux function

$\mathcal{M}_i$ -molecular weight of species i

Γ -diffusion coefficient

Subscripts

i, j, k	-grids locations in x, y, z directions
x, y, z	-components in x, y, z directions
x, y, z	-differences in x, y, z directions
lam	-laminar
ref	-reference condition
stag	-stagnation value
turb	-turbulent quantity
wall	-wall value
prod	-production
∞, *inf*	-free stream value

Superscripts

i	-index in marching direction
$'$	-fluctuation in turbulent flow, averaged variables
$''$	- fluctuation in turbulent flow, mass- averaged variables

Overbars

$\bar{}$	- averaged quantity or time-averaged quantity
$\tilde{}$	- mass averaged variables