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Nomenclature

Symbols

A area

$C_K = (\partial \varepsilon_K / \partial w_K)_p$ gradient of a vector in the state phase diagram

$c_{Kp} = (\partial h_K / \partial T)_p$ specific heat at constant volume

$c_{Kv} = (\partial e_K / \partial T)_v$ specific heat at constant pressure

$D$ mass diffusivity

$e_K$ internal energy

$e_K^v$ constant internal energy and specific volume

$G$ Green's function

$g = \frac{p}{\rho_s w_n^2}$ normalized pressure

$F = \frac{\tau}{x} f = \frac{t}{\mu r}$ velocity coordinate of phase space for blast waves

$f = \frac{u}{w_n}$ normalized velocity

$h = \frac{\rho}{\rho_s}$ normalized density

$h_K$ enthalpy

$hp$ constant enthalpy and pressure

$M$ mass

$M_K$ molecular mass

$m_k = 1 - n_k^{-1}$

$n$ polytropic index

$p$ pressure

$P = p/p_i$ normalized pressure
Nomenclature

- \( q_{Ro} \): Reference exothermic energy
- \( q_{Ro} - u_{Po} \): Reference exothermic energy
- \( q_{W} \): Energy expended by heat transfer to the walls
- \( R \): Reactants, universal gas constant
- \( R_K \): \( R/M_K \)
- \( t \): Time
- \( T_K \): Temperature
- \( U \): Velocity normal to exothermic front
- \( u \): Internal energy in thermodynamic tables
- \( v \): Specific volume
- \( V \): \( V_{k/v_i} \)
- \( w \): Dynamic potential
- \( w_{W} \): Energy expended by work on the surroundings
- \( W_K \): \( w_{K}/w_{Si} \)
- \( x \): Progress parameter, \( r/r_n \)
- \( Y_K \): Mass fraction
- \( Y_R \): Mass fraction of reactants
- \( Z \): \( \left( \frac{\tau}{\epsilon} \right)^2 \frac{g}{h} = \left( \frac{t}{\mu r} \right)^2 \frac{p}{\rho} \) Velocity of sound coordinate
- \( z_K \): \( e_{K,w_{K}} \), Generalized state coordinate
- \( \alpha \): Thermal diffusivity; coefficient of the life function
- \( \chi \): Power index of life function
- \( \Delta \): Dilatation
- \( \delta \): Dirac delta function; Index in life function
- \( \varepsilon \): \( e/w_n^2 \), Normalized internal energy
- \( \Phi \): Scalar potential of (irrotational) velocity
- \( \gamma \): Isentropic index
- \( \kappa \): Bulk viscosity
- \( \lambda \): Air-equivalence ratio
- \( \lambda \): \( d \ln \gamma / d \ln \xi = \frac{1}{2} d \ln w_n / d \ln r_n = -2 \frac{r_n t_n}{\tilde{r}_n^2} \) Decay parameter of blast waves
- \( \mu \): \( d \ln r_n / d \ln t_n = \frac{d \ln \xi}{d \ln \eta} = \frac{w_n t_n}{r_n} = \frac{\lambda + 2}{2} \) Velocity modulus of blast waves
- \( \mu \): Shear viscosity
ν  ν_s/ν_c normalized volume, stoichiometric coefficient, kinematic viscosity
π  pν^n polytropic pressure model
θ  crank angle
ρ  density
σ  air/fuel mass ratio

τ  \frac{t - t_i}{t_f - t_i}, \frac{\Theta - \Theta_i}{\Theta_f - \Theta_i} progress parameter of time, \frac{t}{r_o}
ξ  \frac{r_n}{r_o} normalized front radius of a blast wave
ζ  exponent of the life function

Vectors

B  vector potential of (rotational) velocity
n_F  unit vector normal to front
s  unit vector unidirectional to front
u  velocity vector
u_A  dilatational velocity component
u_ω  vortical velocity component
U  component of velocity vector normal to exothermic front
W_F  exothermic front velocity
x  space co-ordinate
ω  vorticity vector

Subscripts

A  air
a  atmosphere of surroundings
c  compression
E  effective part of generated products, or of consumed fuel
f  final state
F  front, fuel
i  initial state
I  ineffective part of generated products or of consumed fuel
n  front
p  piston, effective part of consumed fuel
Nomenclature

P  products
R  reactants
st  stoichiometric
S  system

Designations

A  air
B  inert component
C  charge
c  compression
e  expansion
E  effective
F  fuel
f  final
i  initial
I  ineffective
K  A, F, R, B, C, P
R  reactants
P  products
s  surroundings
S  system
t  terminal
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