

## GLOSSARY OF FORTRAN VARIABLES

NAME	LOCATION	TYPE	MEANING
A	COMP	Array	Coefficient.
A	PLOT	Array	One line of printed characters.
ABS		Standard function	Absolute value of.
ADPEI	COMA	Array	Cell area ÷ PEI.
AFLOWD	MAIN		Downstream flow area.
AFLOWU	MAIN		Upstream flow area.
AGRAV	COMB		Gravitational acceleration.
AGRVDX	PHYS		AGRAV × DX.
AHIN	COMB		Constant in HIN function.
AK	COMB		Von Karman constant.
ALMG	COMB		Mixing-length constant, λ.
ALMGD	COMB	Array	" , for various KINDS.
ALOG		Standard function	
AM	WALL		Mass-transfer parameter.
AMACH	OUTP		Mach Number.
AMAXI		Standard function	Largest of.
AMINI		Standard function	Smallest of.
AMRE	WALL		AM × Reynolds Number.
AMRESQ	WALL		AMRE squared.
AREA	MAIN		Area of flow when free boundary at I.
AREX	COMB		Constant in REX function.
ARG	WALL		Logarithm of argument.
ARGMIN	WALL		Smallest value of ARG.
ARROCN	COMB		Arrhenius constant, E/R.
AUEX	COMB		Constant in UEX expression.
B	COMP	Array	Coefficient.
BEE	WALL		Exponent.
BHEX	COMB		Constant in HEX expression.
BHIN	COMB		Constant in HIN expression.
BIG	COMA		A large number.
BLANK	PLOT		A printer space.
BOM	COMA	Array	Ω with a cell.
EP	WALL	Array	Big psi.
EPE	COMP		Big psi at E.
EPI	COMP		Big psi at I.
EPLAST	WALL		Last value of EP.
BUEX	COMB	Array	Constant in UEX expression.
C	COMP	Array	Coefficient.
CEBU	COMB		Eddy-break-up coefficient.
CEBUDX	PHYS		CEBU × DX.
CFU	COMP		Specific heat of fuel.
CHEX	COMB		Constant in HEX expression.
CHIN	COMB		Constant in HIN expression.
CMIX	COMB		Specific heat of mixture.

NAME	LOCATION	TYPE	MEANING
COMA		Labelled COMMON block	NB: In SUBROUTINE COMP only, COMA specifies a 1-D F array.
COMB		Labelled COMMON block	
COMP		SUBROUTINE name	Compute.
CON	COMP	Array	Lateral-convection quantity.
CONST1	COMP		$0.5 * DXDPEI$ .
CONST2	COMP		$0.5 * CONST1$ .
CONST3	COMP		$0.25 * CONST1$ .
COSD2	COMP		$\frac{1}{2} \cos \alpha$ .
COX	COMB		Specific heat of oxygen.
CPR	COMB		Specific heat of product.
CROSS	PLOT		A printer symbol.
CSALFA	COMA		COSINE $\alpha$ .
CUEX	COMB		Constant in UEX expression.
D	COMP	Array	Coefficient.
DA	MAIN		Area increment.
DADP	MAIN		DA/DP.
DA1	COMB		First non-dimensional area error.
DA2	COMB		Second non-dim. area error.
DFE	OUTP	Array	F-difference at E boundary.
DFI	OUTP	Array	F-difference at I boundary.
DIF	COMA	Array	Diffusion quantity.
DIFU	COMA	Array	Diffusion quantity related to velocity.
DIGIT	PLOT		Number printed beside X-axis.
DISTAN		ENTRY in COMP	Distance.
DOT	PLOT		A printer symbol.
DP	COMA		Pressure increment.
DPDX	COMB		Pressure gradient.
DPEI	MAIN		Increment in PEI.
DUDY	PHYS	Array	Velocity gradient.
DUDYL	PHYS		Velocity gradient $\times$ length.
DUDYMN	PHYS		Minimum value of DUDY.
DX	COMA		Forward-step size.
DXDPEI	COMP		$DX \div PEI$ .
DXLAST	COMA		Last value of DX.
DXMAX	COMB		Special DX limit.
DXRAT	COMB		DX ratio.
EF	WALL		Pressure-gradient parameter.
EL	PHYS	Array	Mixing-length.
EL12	PHYS		Mixing-length in range 12.
EL23	PHYS		Mixing-length in range 23.
EL34	PHYS		Mixing-length in range 34.
EL45	PHYS		Mixing-length in range 45.
EL56	PHYS		Mixing-length in range 56.
EMU	COMA	Array	Effective viscosity.

NAME	LOCATTON	TYPE	MEANING	
FMUT	PHYS	Standard function	Turbulent viscosity.	
ENT	COMP		Entrainment quantity.	
ENTH	MAIN		Enthalpy.	
ENTHA	COMB		Enthalpy of A-stream.	
ENTHB	COMB		Enthalpy of B-stream.	
ENTHC	COMB		Enthalpy of C-stream.	
ENTHD	COMB		Enthalpy of D-stream.	
EQRAT	OUTP		Equivalence of ratio.	
ER	WALL		$E \times$ Reynolds number.	
EX	PHYS		Excess.	
EXL	PHYS		Last excess.	
EXP			Exponential function.	
EXPMRE	WALL		Expression in laminar wall functions.	
EXPO	PHYS		Arrhenius term.	
EWALL	COMB	Array	Constant in wall function.	
F	COMA		General variable, $\phi$ .	
FACE	COMB		Factor for entrainment at E boundary.	
FACEXP	COMB		Exponent in entrainment routines.	
FACI	COMB		Factor for entrainment at I boundary.	
FDIFE	COMP		F increment at E boundary.	
FDIFY	COMP		F increment at I boundary.	
FLOA	MAIN		Flow rate in A-stream.	
FLOAT			Standard function	Floating-point value.
FLOB	COMB		Flow rate in B-stream.	
FLOC	COMB	Flow rate in C-stream.		
FR	COMB	Fraction used to calculate DUDYMN.		
FRA	COMB	Step size $\div$ layer width.		
FRE	WALL	$EF \times RE$ .		
FUA	COMB	$m_{fu}$ in A stream.		
FUB	COMB	$m_{fu}$ in B stream.		
FUBRNT	PHYS	$m_{fu}$ in fully-burnt gas.		
FUC	COMB	$m_{fu}$ in C stream.		
FUD	COMB	$m_{fu}$ in D stream.		
FUEX	PHYS	Excess fuel.		
FUNBT	PHYS	$m_{fu}$ in unburnt gas.		
GAMMA	COMB	ENTRY in COMP	Specific heat ratio.	
GASCON	COMB		Universal gas constant, R.	
GRID				
H	COMB		Recovery factor.	
HCON	COMP	Array	$\frac{1}{2}$ CON.	
HCONDF	COMP		HCON difference.	

## Glossary of Fortran Variables

NAME	LOCATION	TYPE	MEANING
HCONI HDIV	COMP COMB		HCON at I boundary. Height of division between streams.
HDUCID	MAIN		Downstream value of the height of the inner boundary of the duct.
HFU HEX	COMB MAIN	Arithmetic statement function.	Heat of combustion of fuel. Outer height.
HEXD	MAIN		Downstream value of external height.
HEXO HIN	COMB MAIN	Arithmetic statement function.	Constant in HEX function. Inner height.
HIND	MAIN		Downstream value of inner height of stream.
HINO	COMB		Constant in HIN function.
HOMDFE	COMP		.5*OMDIF for E boundary.
HOMDFI	COMP		.5*OMDIF for I boundary.
HPEI	COMP		$\frac{1}{2}$ PEI.
HRECP	COMP		$\frac{1}{2}$ RECP.
HUDIF	PHYS		.5*UDIF.
HUDMAX	PHYS		$\frac{1}{2}$ UXMAX.
HUFAC	PHYS		$\frac{1}{2}$ UFAC.
I			Index, usually for position across grid.
IBEX	COMA	Array	Index for type of condition at E boundary.
IBIN	COMA	Array	Index for type of condition at I boundary.
IDASH	PHYS		Index.
IDASH	COMP		Index.
IDIME	PLOT		Dimension for arrays in PLOT.
IDIMF	COMA		Dimension for 1D F array in SUBROUTINE COMP.
IDIV	MAIN		I of division between B and C streams.
IDJ	COMP		Used to compute 1D F array indices.
IEND	MAIN		Index for XEND.
IFIN			Index triggering finish of integration.
IFIX		Standard function	Integer value, with truncation.
IJ	COMP		Index of 1D F array equivalent to (I,J).
ILDIM	OUTP		Variable dimension for longitudinal PLOT.

NAME	LOCATION	TYPE	MEANING	
ILPLOT	COMB	ENTRY point in SUB- ROUTINE COMP	Index to obtain longitudinal PLOT.	
IM	PLOT		Index in PLOT.	
IMAX			Number of values to be plotted.	
INERT	COMB		Indicator of chemically-inert flow.	
INIT			Initialise.	
INJ	COMP		Index in 1D F array, equivalent to (N,J).	
INMLJ	COMP		Index in 1D F array, equivalent to (NML,J).	
IOUT	MAIN		Index appropriate to XOUT.	
IPRINT	COMB		Index to control type of printout required.	
IRUN	COMB		Index to identify a particular computer run.	
ISTART	MAIN		ASSIGNED statement number	
ISTEP	COMA			Counter of forward steps.
ITDIM	OUTP			Variable dimension for cross-stream (transverse) PLOT.
ITEST	COMA			Trigger for TEST output.
ITPLOT	COMB	Index to obtain cross-stream PLOT.		
IX	PLOT	Index in PLOT.		
IY	PLOT	Index in PLOT.		
I1J	COMP	Index of 1D F array equivalent to (1,J).		
I2J	COMP	Index of 1D F array equivalent to (2,J).		
I1	WALL	I value for WALL.		
I2	WALL	Next I value away from WALL.		
I3	WALL	Next I value away from WALL.		
J	COMA	Index usually associated with a dependent variable.		
JKIME	PLOT	Dimension for arrays in PLOT.		
JF	COMB	Index for fuel.		
JH	OUTP	Index for stagnation enthalpy.		
JLDIM	OUTP	Variable dimension for longitudinal PLOT.		
JM	PLOT	Index in PLOT.		
JMAX	PLOT	Number of curves to be plotted.		

NAME	LOCATION	TYPE	MEANING
JOX	COMB		J for oxygen.
JP	COMB		J for combustion.
JPR	COMB		J for product.
JTDIM	OUTP		Variable dimension for cross-stream (transverse) PLOT.
JTE	COMB		Index for temperature.
JUSTEX	COMA		Boundary-condition-change index at E.
JUSTIN	COMA		Boundary-condition index at I.
K	OUTP		Index.
K	PHYS	ASSIGNED statement number	
K	PLOT		Index.
KASE	COMB		Index denoting problem type.
KEX	COMA		Index to denote type of E boundary.
KIN	COMA		Index to denote type of I boundary.
KIND	COMB		Index denoting problem type.
KOUT	OUTP		Number of cross-stream variables output.
KRAD	COMA		Index denoting <del>plain</del> or <i>plane</i> axi-symmetrical geometry.
KSOURC	COMA		Index for sources in COMP.
KUDIF	COMB		Index to test whether UDIF has been calculated.
KWALL	WALL		Index denoting E or I boundary.
KX	PLOT		Index.
KY	PLOT		Index.
L	PLOT		Index.
LAB	OUTP		Labels for cross-stream profiles.
LASTEP	COMB		Maximum value of ISTEP.
M	PLOT		Index.
MINO		Standard function	Smallest integer of.
MAIN		MAIN program - the starting point	
MOD		Standard function	For remaindering.
MODEL	COMB		Indicator of transport-process type.

NAME	LOCATION	TYPE	MEANING
MOMSOU	COMA		Index for momentum source.
N	COMA		Number of points across grid.
N	PLOT		Index.
NEWPR	COMA		Index to denote that RECPR differs from that at previous J.
NF	COMA		Number of dependent variables, not counting u.
NIT	WALL		Number of iterations.
NM1	COMA		N - 1.
NM2	COMA		N - 2.
NM3	COMA		N - 3.
NOVEL	COMA		No-velocity index.
NPLOT	COMB		Number of steps after which plots are to be printed.
NPROF	COMB		Number of steps after which profiles are to be printed.
NSTAT	COMB		Number of steps after which station variables are to be printed.
NX	PLOT		Index.
NYL	OUTP		Number of variables for longitudinal (downstream) PLOT.
NYT	OUTP		Number of variables for transverse (cross-stream) PLOT.
OM	COMA	Array	$\omega$ .
OMDLF	COMP	Array	$\omega$ difference.
OMDIV	MAIN		$\omega$ for division between streams.
OME	COMP		$\omega$ difference in the E boundary.
OMI	COMP		$\omega$ difference in the I boundary.
OMINT	COMA	Array	$\omega$ for cell interfaces.
OMPOW	COMB		$\omega$ power.
OUT	OUTP	Array	Used for output of cross-stream variables (profiles).
OUTP		Same as OUTPUT	Output.
OUT1	WALL		Output from WALL.
OUT2	WALL		Output from WALL.
OUTPUT		SUBROUTINE name	
OXA	COMB		Oxygen content of A stream.
AXB	COMB		Oxygen content of B stream.
OXC	COMB		Oxygen content of C stream.



NAME	LOCATION	TYPE	MEANING
OXD	COMB		Oxygen content of D stream.
PDGSON	MAIN		Pressure ÷ gas constant.
PEI	COMA		$\psi_I - \psi_E$ .
PEILIM	COMB		Limit on fractional increment of PEI.
PHIA	COMB		Value of $\phi$ in A stream.
PHIB	COMB		Value of $\phi$ in B stream.
PHIC	COMB		Value of $\phi$ in C stream.
PHID	COMB		Value of $\phi$ in D stream.
PHYS		SUBROUTINE name.	Physics.
PHYSF		ENTRY point in SUBROUTINE PHYS.	
PHYSU		ENTRY point in SUBROUTINE PHYS.	
PJAY	WALL		Jayatillaka's P function.
PLOT		Same as PLOTS.	
PLOTS		SUBROUTINE name.	
PREEXP	COMB		Pre-exponential factor.
PRESS	COMB		Pressure.
PRL	COMB	Array	Laminar Prandtl number.
PRLAM	COMB		Laminar Prandtl number.
PRRAT	WALL		Prandtl number ratio.
PTURB	COMB		Turbulence Prandtl number.
PSIE	COMA		$\psi_E - \psi_I$ .
PSII	COMA		$\psi_I$ .
R	COMA	Array	Radius.
RAT	COMP		Ratio.
RATI or E	MAIN		Ratio.
RATIO	PHYS		Ratio.
RE	WALL		Reynolds number.
RECP	COMP		$DX \div PEI$ .
RECR1	COMP		Reciprocal of R1.
RECGMP	MAIN		Reciprocal of $\gamma$ - pressure product.
RECPR	PHYS		Reciprocal of Prandtl number.
RECPRL	COMB	Array	Reciprocal of laminar Prandtl number.
RECPRT	COMB	Array	Reciprocal of turbulence Prandtl number.
RECRU	COMA	Array	Reciprocal of density-velocity product.



NAME	LOCATION	TYPE	MEANING
RECWFU	MAIN		Reciprocal of WFU.
RECWMX	MAIN		Reciprocal of WMX.
RECWOX	MAIN		Reciprocal of WOX.
RECWPR	MAIN		Reciprocal of WPR.
RECYDF	COMA	Array	Reciprocal of Y-difference.
REY	COMB		Reynolds number.
RHM	PHYS		Average density.
RHO	COMA	Array	Density.
RHOA	MAIN		Density of A stream.
RHOE	MAIN		Density of B stream.
RHOC	MAIN		Density of C stream.
RHOCON	MAIN		Density constant.
RHOFAC	MAIN		Density factor.
RHOREF	WALL		Reference density.
RJTOTE	COMA	Array	Radius $\times$ total flux E boundary.
RJTOTI	COMA	Array	Radius $\times$ total flux I boundary.
RME	COMA		Radius $\times$ negative of entrainment at E boundary.
RMI	COMA		Radius $\times$ entrainment rate at I boundary.
RPRLST	PHYS		Last value of RECPR.
RREF	WALL		Reference radius.
RRUREF	WALL		Reference value of radius $\times$ density-velocity product.
RUREF	OUTPUT		Density-velocity product.
RUREF	WALL		Density-velocity product.
R1D2	COMP		$R(1) \div 2$ .
R1D2SQ	COMP		R1D2 squared.
S	PLOT		A scaling factor.
S	WALL		Friction factor of Prandtl number.
SAV	WALL		Average value of S.
SHALF	WALL		Square-root of S.
SHALF1	WALL		Square-root of S.
SI	COMA	Array	Source term.
SINM1	COMP		Stored value of SI(NM1).
SIP	COMA	Array	Second component of source term.
SI2	COMP		Stored value of SI(2).
SLOC	WALL		Local value of S.
SOLVE		ENTRY point in SUBROUTINE COMP.	
SQRT		Standard function	

NAME	LOCATION	TYPE	MEANING	
SRE	WALL	Array	S × Reynolds number.	
STANE	OUTP		Stanton number of E boundary.	
STANI	OUTP	Array	Stanton number of I boundary.	
STOICH	COMB	Array	Stoichiometric ratio.	
STORE	COMP		Stored variable.	
STORE	WALL		Stored variable.	
SUM	MAIN		Sum.	
S1	WALL		Stored value.	
S2	WALL		Stored value.	
S3	WALL		Stored value.	
S4	WALL		Stored value.	
S5	WALL		Stored value.	
T	COMP		Temporarily stored value.	
T	WALL		Temporarily stored value.	
TA	COMB		Temperature of A stream.	
TAN			Standard function	
TAUE	COMA			Shear-stress at E boundary.
TAUED	OUTP			Dimensional value of TAUE.
TAUI	COMA		Shear-stress at I boundary.	
TAUID	OUTP		Dimensional value of TAUI.	
TB	COMB		Temperature of B stream.	
TC	COMB		Temperature of C stream.	
TD	COMB		Temperature of D stream.	
TE	COMP		Transport coefficient at E boundary.	
TEF	COMP		Transport coefficient at E boundary.	
TEM	OUTP		Temporarily stored quantity.	
TERM	PHYS		Temporarily stored quantity.	
TI	COMP		Transport coefficient at I boundary.	
TIF	COMP		Transport coefficient at I boundary.	
TINY	COMA	Array	Small number.	
TITLE	OUTP		Print heating for KINDS.	
TMIN	MAIN		Minimum temperature.	
TWALL	COMB		Wall temperature.	
TWDCOS	COMP		$2 \div \cos \alpha$ .	
T1	PHYS		Temporarily stored quantity.	

NAME	LOCATION	TYPE	MEANING	
T2	MAIN	Array	Temporarily stored quantity.	
T2	PHYS		Temporarily stored quantity.	
T3	PHYS		Temporarily stored quantity.	
T4	PHYS		Temporarily stored quantity.	
U	COMA		Forward velocity.	
UA	COMB		U of A stream.	
UB	COMB		U of B stream.	
UBAR	COMB		Average velocity.	
UC	COMB		U of C stream.	
UD	COMB		U of D stream.	
UDIF	COMB		UMAX - UMIN.	
UDMAX	PHYS		Maximum velocity difference.	
UDMIN	PHYS		Minimum velocity difference.	
UEX	MAIN		Arithmetic statement function for external velocity	
UEXO	COMB			Constant in UEX function.
UFAC	COMB			Velocity factor.
UFLUX	COMB	Convective flux of momentum.		
ULIM	COMB	Factor related to entrainment.		
UMAX	PHYS	Maximum velocity.		
UMIN	PHYS	Minimum velocity.		
UREF	OUTP	Reference velocity.		
UREF	WALL	Reference velocity.		
URUREF	OUTP	$U \times RUREF$ .		
VISFU	COMB	Viscosity constant of fuel.		
VISMIX	COMB	Viscosity constant of mixture.		
VISOX	COMB	Viscosity constant of oxygen.		
VISPR	COMB	Viscosity constant of product.		
VMIX	MAIN	SUBROUTINE name		Specific volume of mixture.
VREF	WALL			Reference viscosity.
WB	MAIN		Molecular weight of B stream.	
WC	MAIN		Molecular weight of C stream.	
WFU	COMB		Molecular weight of fuel.	
WMIX	COMB		Molecular weight of mixture.	
WOX	COMB		Molecular weight of oxygen.	
WPR	COMB		Molecular weight of product.	
X	PLOT		Array	Abscissa X in PLOT.
XAXIS	PLOT			Label on abscissa X.

NAME	LOCATION	TYPE	MEANING
XD	COMA		Downstream distance.
XEND	COMB		x for the end of the inner pipe.
XHEXO	COMB		Constant in HEX function.
XHINO	COMB		Constant in HIN function.
XLAXIS	OUTP		Label for abscissa in longitudinal PLOT.
XIPLLOT	OUTP	Array	Downstream distance array for longitudinal PLOT.
XMAX	PLOT		Maximum X in PLOT.
XMIN	PLOT		Minimum X in PLOT.
XOUT	COMB		x for the end of the outer duct.
XR	PLOT		Scaling variable.
XSIZE	PLOT		Scaling factor for printer page width for PLOT.
XTAXIS	OUTP		Label for abscissa in cross-stream PLOT.
XIPLLOT	OUTP	Array	Cross-stream distance array for transverse PLOT.
XU	COMA		x for upstream limit of forward step.
XUEXO	COMB		Constant in UEX function.
XULAST	COMB		Largest permissible value of XU.
Y	COMA	Array	Cross-stream distance.
Y	PLOT	Array	Plotted ordinate values.
YAXIS	PLOT	Array	Labels for plotted values.
YE	COMA		Width of half-interval close to E boundary.
YEDGE	PHYS	Array	Y value for mixing-layer edge.
YI	COMA		Distance of interval near I boundary.
YL	PLOT		Number printed beside Y-axis.
YLAXIS	OUTP		Labels for ordinate of PLOT.
YIPLLOT	OUTP	Array	Values to be plotted.
YMAX	PLOT	Array	Maximum Y in PLOT.
YMIN	PLOT	Array	Minimum Y in PLOT.
YR	PLOT		Scaling variable.
YSIZE	PLOT		Scaling factor for printer page height for PLOT.
YREF	WALL		Distance across the Couette flow.
YTAXIS	OUTP	Array	Labels for ordinate of PLOT.
YIPLLOT	OUTP	Array	Values to be plotted.
YVALUE	PHYS		Value of Y.