
 DOCMOD: DOCUMENTATION OF FORTRAN MODULES SOURCE
 P. ROBERT, 1990, revised 1996

file source: **rocotlib_V3p2.f**

nb. of lines : 5465
 nb. of function : 1
 nb. of subroutine: 190
 nb. of program : 0

nb. of modules : 191
 nb. of categories: 8

basic compute modules (9)

type	module	arguments	object	author
subr	cp_angle_and_rat	(ux,uy,uz,vx,vy,vz,angle,ratio)	compute_angle_and_ratio beetween U and V vectors	P. Robert, CRPE, 1992
subr	cp_Euler_interp	(a1,b1,c1,a2,b2,c2,ti,dt,ai,bi,ci)	compute_Euler_angles_interpolation	P. Robert, SDev, 2020
subr	cp_geo_dipole_di	(iyear,idoy,d1,d2,d3)	compute_dipole_direction in GEO system	P. Robert, LPP , 2016
subr	cp_gei_sun_dir	(iyear,idoy,ih,im,is,	compute_sun_direction in GEI system	CT.Russel, CE-D, 1971,Rev. P.R., 1992,2001,2002
subr	cp_sunrise_sunset	(iyear,imon,iday,rlat,rlon,	compute_sunset_time and others	P. Robert, CRPE, 2001,Revised Dec. 2011
subr	cp_time_param	(iyear,imonth,iday,ih,im,is)	compute_time_parameters and time-dependent matrix	P. Robert, CRPE, 1992
subr	cp_time_param2	(jd1950,houday)	compute_time_parameters and time-dependent matrix	P. Robert, CRPE, 2001
subr	cp_time_param3	(jd2000,houday)	compute_time_parameters and time-dependent matrix	P. Robert, CRPE, 2001
subr	cp_tpn_param	(xo,yo,zo,xs, Tx,Ty,Tz, Px,Py,Pz, Nx,Ny,Nz)	compute_TPN_system	P. Robert, CETP, 2004

give modules (7)

type	module	arguments	object	author
subr	g_gei_geo_dipole	(dxgei,dygei,dzgei,	give_dipole_direction in GEI and GEO system	P. Robert, CRPE, 1992
subr	g_gsm_dipole_til	(diptan)	give_dipole_tilt_angle in radians	P. Robert, CRPE, 1992
subr	g_gei_geo_eclipt	(exgei,eygei,ezgei,	give_ecliptic_direction in GEI and GEO system	P. Robert, CRPE, 1992
subr	g_gei_geo_sun_ro	(rxgei,rygei,rzgei,rxgeo,rygeo,rzgeo)	give_sun_rotation_direction in GEI and GEO system	P. Robert, CRPE, 1992
subr	g_gei_geo_sun_di	(sxgei,sygei,szgei,sxgeo,sygeo,szgeo)	give_sun_direction in GEI and GEO system	P. Robert, CRPE, 1992
subr	g_gei_sun_param	(gmst,slon,sras,sdec,obli)	give_sun_parameter dependant of time in GEI system	P. Robert, CRPE, 1992
subr	g_rocot_version	(vernum,verdat)	give_version_number and modification date of the library	P. Robert, CRPE, 1992

calendar modules (20)

type	module	arguments	object	author
subr	cp_nbdays_in_mont	(iyear, imonth, nbday)	compute_number_of_day_of_the_month	P. Robert, CRPE, 2001
subr	cp_en_day_name	(iday, cday, nbcha)	compute_english_day_name, ex: 'Monday' for iday=1	P. Robert, CRPE, 2001
subr	cp_en_month_name	(imonth, cmonth, nchar)	compute_english_month_name	P. Robert, CRPE, 2001
subr	cp_fr_day_name	(iday, cday, nbcha)	compute_french_day_name, ex: 'Lundi' for iday=1	P. Robert, CRPE, 2001
subr	cp_fr_month_name	(imonth, cmonth, nchar)	compute_french_month_name	P. Robert, CRPE, 2001
subr	cp_leap_year	(iyear, ileap)	compute_leap_year with ileap=1 for leap year, 0 if not	P. Robert, CRPE, 1992
subr	cp_seasons	(iyear, id_sso, id_wso, id_seq, id_feq,	compute_seasons, i.e. solstice & equinox	P. Robert, SDev, 2017
subr	cv_doty_to_date	(ido, iyear, imonth, iday)	convert_day_of_year for a given year in date	P. Robert, CRPE, 1992
subr	cv_jul2000_to_da	(jd00, iyear, imonth, iday)	convert_julian_day_2000 in date	P. Robert, CRPE, 1992
subr	cv_jul1950_to_da	(jd50, iyear, imonth, iday)	convert_julian_day_1950 in date	P. Robert, CRPE, 1992
subr	cv_weekn_to_date	(iweek, iyear, imonth, iday)	convert_first_day_of_week_number in date	P. Robert, CRPE, 2001
subr	cv_date_to_dotw	(iyear, imonth, iday, idow)	convert_date in day_of_the_week	P. Robert, CRPE, 2001
subr	cv_date_to_doty	(iyear, imonth, iday, ido)	convert_date in day_of_year with ido=1 for january 1	P. Robert, CRPE, 1992
subr	cv_hms_to_dech	(ih, im, is, hofday)	convert_hours_minutes_seconds in decimal hour of the day	P. Robert, CRPE, 1992
subr	cv_date_to_jul19	(iyear, imonth, iday, jd50)	convert_date in julian_day_1950 with jd50=0 for jan 1	P. Robert, CRPE, 1992
subr	cv_date_to_jul20	(iyear, imonth, iday, jd00)	convert_date in julian_day_2000 with jd00=0 for january 1	P. Robert, CRPE, 1992
subr	cv_dhms_to_msotd	(ih, im, is, ims, milday)	convert_hours_minutes_seconds_ms in millisec_of_day	P. Robert, CRPE, 2001
subr	cv_dech_to_hms	(hofday, ih, im, is)	convert_decimal hour of the day in time	P. Robert, CRPE, 1992
subr	cv_msotd_to_hmsm	(milday, ih, im, is, ims)	convert_millisec. of the day in time	P. Robert, CRPE, 2001
subr	cv_date_to_weekn	(iyear, imonth, iday, iweek)	convert_date in week_of_the_year	P. Robert, SDev, 2017

matrix operations (15)

type	module	arguments	object	author
subr	mat_cp_varmin	(ifc, Vx, Vy, Vz, n, irep, covar, lambda, eigvec)	compute variance minimum coordinate of a signal Vx, Vy, Vz	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_cp_covarianc	(Vx, Vy, Vz, n, covar)	compute covariance matrix for a vector series V(n)	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_diagonalise	(mat, lambda, eigvec)	diagonalise the given matrix mat(3,3)	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_check_ortho	(ifc, mat)	check orthogonality of matrix components	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_cp_determin	(mat, det)	compute determinant of the given matrix	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_cp_eigen_vec	(mat, lambda, eigvec)	compute eigen vectors and eigen values of real mat(3,3)	unknown, CETP, 2001, rev. PR 2016
subr	mat_cp_pythag_fu	(a, b, fpyth)	Pythagore function of two real (used by mat_cp_eigen_vec)	unknown, CETP, 2001, rev. PR 2016
subr	mat_normalize_ve	(mat)	normalize to 1. the vectors of the input matrix	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_product	(mat1, mat2, mat3)	matrix product of two given matrix of dim. 3	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_somme	(mat1, mat2, mat3)	matrix somme of two given matrix of dim. 3	P. Robert, LPP , 2016
subr	mat_diff	(mat1, mat2, mat3)	matrix difference of two given matrix	P. Robert, LPP , 2016
subr	mat_transpose	(mat)	transpose input matrix	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_change_coord	(mat, Vx, Vy, Vz, n)	change coordinate of a vector serie with a given matrix	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_write	(ifc, com, mat)	print on ifc unit mat(3,3) with a comment	P. Robert, CETP, 2001, rev. PR 2016
subr	mat_write_eigen_	(ifc, lambda, mat)	print on ifc unit eigen values & vectors of mat(3,3)	P. Robert, CETP, 2001, rev. PR 2016

transformation modules (50)

type	module	arguments	object	author
subr	t_car_to_sph	(x,y,z,r,teta,phi)	transforms_car_to_sph: CAR -> SPH system	P. Robert, CRPE, 1992
subr	t_dm_to_geo	(xdme,ydme,zdme,rlat,rlong,xgeo,ygeo,zgeo)	transforms_dme_to_geo: DM -> GEO system	P. Robert, CRPE, 1992
subr	t_gei_to_geo	(xgei,ygei,zgei,xgeo,ygeo,zgeo)	transforms_gei_to_geo: GEI -> GEO system	P. Robert, CRPE, 1992
subr	t_gei_to_gse	(xgei,ygei,zgei,xgse,ygse,zgse)	transforms_gei_to_gse: GEI -> GSE system	P. Robert, CRPE, 1992
subr	t_gei_to_gsm	(xgei,ygei,zgei,xgsm,ygsm,zgsm)	transforms_gei_to_gsm: GEI -> GSM system	P. Robert, CRPE, 1992
subr	t_gei_to_gseq	(xgei,ygei,zgei,xgsq,ygsq,zgsq)	transforms_gei_to_gsq: GEI -> GSEQ system	P. Robert, CRPE, 1992
subr	t_gei_to_mag	(xgei,ygei,zgei,xmag,ymag,zmag)	transforms_gei_to_mag: GEI -> MAG system	P. Robert, CRPE, 1992
subr	t_gei_to_sm	(xgei,ygei,zgei,xsma,ysma,zsma)	transforms_gei_to_sma: GEI -> SM system	P. Robert, CRPE, 1992
subr	t_geo_to_dm	(xgeo,ygeo,zgeo,rlat,rlong,xdme,ydme,zdme)	transforms_geo_to_dme: GEO -> DM system	P. Robert, CRPE, 1992
subr	t_geo_to_gei	(xgeo,ygeo,zgeo,xgei,ygei,zgei)	transforms_geo_to_gei: GEO -> GEI system	P. Robert, CRPE, 1992
subr	t_geo_to_gse	(xgeo,ygeo,zgeo,xgse,ygse,zgse)	transforms_geo_to_gse: GEO -> GSE system	P. Robert, CRPE, 1992
subr	t_geo_to_gsm	(xgeo,ygeo,zgeo,xgsm,ygsm,zgsm)	transforms_geo_to_gsm: GEO -> GSM system	P. Robert, CRPE, 1992
subr	t_geo_to_gseq	(xgeo,ygeo,zgeo,xgsq,ygsq,zgsq)	transforms_geo_to_gsq: GEO -> GSEQ system	P. Robert, CRPE, 1992
subr	t_geo_to_mag	(xgeo,ygeo,zgeo,xmag,ymag,zmag)	transforms_geo_to_mag: GEO -> MAG system	P. Robert, CRPE, 1992
subr	t_geo_to_sm	(xgeo,ygeo,zgeo,xsma,ysma,zsma)	transforms_geo_to_sma: GEO -> SM system	P. Robert, CRPE, 1992
subr	t_geo_to_vdh	(xgeo,ygeo,zgeo,rlat,rlong,xvdh,yvdh,zvdh)	transforms_geo_to_vdh: GEO -> VDH system	P. Robert, CRPE, 1992
subr	t_gse_to_gei	(xgse,ygse,zgse,xgei,ygei,zgei)	transforms_gse_to_gei: GSE -> GEI system	P. Robert, CRPE, 1992
subr	t_gse_to_geo	(xgse,ygse,zgse,xgeo,ygeo,zgeo)	transforms_gse_to_geo: GSE -> GEO system	P. Robert, CRPE, 1992
subr	t_gse_to_gsm	(xgse,ygse,zgse,xgsm,ygsm,zgsm)	transforms_gse_to_gsm: GSE -> GSM system	P. Robert, CRPE, 1992
subr	t_gse_to_gseq	(xgse,ygse,zgse,xgsq,ygsq,zgsq)	transforms_gse_to_gsq: GSE -> GSEQ system	P. Robert, CRPE, 1992
subr	t_gse_to_mfa	(xgse,ygse,zgse,bx,by,bz,xmfa,ymfa,zmfa)	transforms_gse_to_mfa: GSE -> MFA system	P. Robert, LPP, 2016
subr	t_gse_to_sr2	(xgse,ygse,zgse,rotx,roty,rotz,	transforms_gse_to_sr2: GSE -> SR2 system	P. Robert, CETP, 2001
subr	t_gse_to_tpn	(xgse,ygse,zgse,xo,yo,zo,xs,xtpn,ytpn,ztpn)	transforms_gse_to_tpn: GSE -> TPN system	P. Robert, LPP, 2016
subr	t_gsm_to_gei	(xgsm,ygsm,zgsm,xgei,ygei,zgei)	transforms_gsm_to_gei: GSM -> GEI system	P. Robert, CRPE, 1992
subr	t_gsm_to_geo	(xgsm,ygsm,zgsm,xgeo,ygeo,zgeo)	transforms_gsm_to_geo: GSM -> GEO system	P. Robert, CRPE, 1992
subr	t_gsm_to_gse	(xgsm,ygsm,zgsm,xgse,ygse,zgse)	transforms_gsm_to_gse: GSM -> GSE system	P. Robert, CRPE, 1992
subr	t_gsm_to_gseq	(xgsm,ygsm,zgsm,xgsq,ygsq,zgsq)	transforms_gsm_to_gsq: GSM -> GSQ system	P. Robert, CRPE, 2002
subr	t_gsm_to_mag	(xgsm,ygsm,zgsm,xmag,ymag,zmag)	transforms_gsm_to_mag: GSM -> MAG system	P. Robert, CRPE, 2002
subr	t_gsm_to_sm	(xgsm,ygsm,zgsm,xsma,ysma,zsma)	transforms_gsm_to_sma: GSM -> SM system	P. Robert, CRPE, 1992
subr	t_gsm_to_tpn	(xgsm,ygsm,zgsm,xo,yo,zo,xs,xtpn,ytpn,ztpn)	transforms_gsm_to_tpn: GSM -> TPN system	P. Robert, LPP, 2016
subr	t_gseq_to_gei	(xgsq,ygsq,zgsq,xgei,ygei,zgei)	transforms_gsq_to_gei: GSEQ-> GEI system	P. Robert, CRPE, 1992
subr	t_gseq_to_geo	(xgsq,ygsq,zgsq,xgeo,ygeo,zgeo)	transforms_gsq_to_geo: GSEQ-> GEO system	P. Robert, CRPE, 1992
subr	t_gseq_to_gse	(xgsq,ygsq,zgsq,xgse,ygse,zgse)	transforms_gsq_to_gse: GSEQ-> GSE system	P. Robert, CRPE, 1992
subr	t_gseq_to_gsm	(xgsq,ygsq,zgsq,xgsm,ygsm,zgsm)	transforms_gsq_to_gsm: GSQ -> GSM system	P. Robert, CRPE, 2002
subr	t_mag_to_gei	(xmag,ymag,zmag,xgei,ygei,zgei)	transforms_mag_to_gei: MAG -> GEI system	P. Robert, CRPE, 1992
subr	t_mag_to_geo	(xmag,ymag,zmag,xgeo,ygeo,zgeo)	transforms_mag_to_geo: MAG -> GEO system	P. Robert, CRPE, 1992
subr	t_mag_to_gsm	(xmag,ymag,zmag,xgsm,ygsm,zgsm)	transforms_mag_to_gsm: MAG -> GSM system	P. Robert, CRPE, 2002
subr	t_mag_to_sm	(xmag,ymag,zmag,xsma,ysma,zsma)	transforms_mag_to_sma: MAG -> SM system	P. Robert, CRPE, 1992

subr	t_sm_to_gei	(xsm,ysma,zsma,xgei,ygei,zgei)	transforms_sma_to_gei: SM -> GEI system	P. Robert, CRPE, 1992
subr	t_sm_to_geo	(xsm,ysma,zsma,xgeo,ygeo,zgeo)	transforms_sma_to_geo: SM -> GEO system	P. Robert, CRPE, 1992
subr	t_sm_to_gsm	(xsm,ysma,zsma,xgsm,ygsm,zgsm)	transforms_sma_to_gsm: SM -> GSM system	P. Robert, CRPE, 1992
subr	t_sm_to_mag	(xsm,ysma,zsma,xmag,ymag,zmag)	transforms_sma_to_mag: SM -> MAG system	P. Robert, CRPE, 1992
subr	t_sph_to_car	(r,teta,phi,x,y,z)	transforms_sph_to_car: SPH -> CAR system	P. Robert, CRPE, 1992
subr	t_sr2_to_gse	(xsr2,ysr2,zsr2,rotx,roty,rotz,	transforms_sr2_to_gse: SR2 -> GSE system	P. Robert, CETP, 2001
subr	t_sr2_to_mfa	(xsr2,ysr2,zsr2,bx,by,bz,rox,roy,roz,	transforms_sr2_to_mfa: SR2 -> MFA system	P. Robert, CETP, 2001
subr	t_sr2_to_sr	(xsr2,ysr2,spifre,spipha,deltaT,xsre,ysre)	transforms_sr2_to_sre: SR2 -> SRef system	P. Robert, CRPE, 2001
subr	t_sr_to_sr2	(xsre,ysre,spifre,spipha,deltaT,xsr2,ysr2)	transforms_sre_to_sr2: SRef-> SR2 system	P. Robert, CRPE, 2001
subr	t_vdh_to_geo	(xvdh,yvdh,zvdh,rlat,rlong,xgeo,ygeo,zgeo)	transforms_vdh_to_geo: VDH -> GEO system	P. Robert, CRPE, 1992
subr	t_xyz_to_vdh	(x,y,z,a1,a2,a3,v,d,h)	transforms_xyz_to_vdh: xyz spinning -> VDH	P. Robert, SDev, 2020
subr	t_vdh_to_xyz	(v,d,h,a1,a2,a3,x,y,z)	transforms_vdh_to_xyz: VDH -> xyz spinning	P. Robert, SDev, 2020

print modules (1)

type	module	arguments	object	author
subr	print_rocot_info		print_library_informations	P. Robert, CRPE, 1992

read modules (4)

type	module	arguments	object	author
subr	r_coordinate_val	(x,y,z,cs)	read coordinate values from input	P. Robert, CRPE, 2002
subr	r_coordinate_sys	(csys)	read coordinate system from input and check validity	P. Robert, CRPE, 2002
subr	r_date	(iyear,imonth,iday)	read_date from input and check validity	P. Robert, CRPE, 1992
subr	r_time	(ih,im,is)	read_time from input and check validity	P. Robert, CRPE, 1992

compatibility with previous version V2.2 (85)

type	module	arguments
subr	cangrat	(ux,uy,uz,vx,vy,vz,angle, ratio)
subr	cdatdoy	(idoy,iyear,imonth,iday)
subr	cdatj00	(jd00,iyear,imonth,iday)
subr	cdatj50	(jd50,iyear,imonth,iday)
subr	cdatwee	(iweek,iyear,imonth,iday)
subr	cdipdir	(iyear,idoy,d1,d2,d3)
subr	cdowweek	(iyear,imonth,iday,idow)
subr	cdoyear	(iyear,imonth,iday,idoy)
subr	cfrdayn	(iday,cday,nbcha)
subr	cfrmonn	(imonth,cmonth,nchar)
subr	chouday	(ih,im,is,houday)
subr	cjd1950	(iyear,imonth,iday,jd50)
subr	cjd2000	(iyear,imonth,iday,jd00)
subr	cmilday	(ih,im,is,ims,milday)
subr	cnbdmon	(iyear,imonth,nbday)
subr	coleapy	(iyear,ileap)
subr	csundir	(iyear,idoy,ih,im,is,gst,slong,sra,sdec,obliq)
subr	csunset	(iyear,imon,iday,rlat,r lon,tmer,tris,tset,
subr	ctimhou	(houday,ih,im,is)
subr	ctimmil	(milday,ih,im,is,ims)
subr	ctimpa2	(jd1950,houday)
subr	ctimpa3	(jd2000,houday)
subr	ctimpar	(iyear,imonth,iday,ih,im,is)
subr	cusdayn	(iday,cday,nbcha)
subr	cusmonn	(imonth,cmonth,nchar)
subr	cweedoy	(iyear,imonth,iday,iweek)
subr	gdipdir	(dxgei,dygei,dzgei,dxgeo,dygeo,dzgeo)
subr	gdiptan	(diptan)
subr	gecldir	(exgei,eygei,ezgei,exgeo,eygeo,ezgeo)
subr	gsrodir	(rxgei,rygei,rzgei,rxgeo,rygeo,rzgeo)
subr	gsundir	(sxgei,sygei,szgei,sxgeo,sygeo,szgeo)
subr	gsunpar	(gmst,slon,sras,sdec,obli)
subr	gvernum	(vernum,verdat)
subr	plibinf	
subr	recoor	(x,y,z,cs)
subr	recsys	(csys)
subr	redate	(iyear,imonth,iday)
subr	retime	(ih,im,is)
subr	tcarsph	(x,y,z,r,teta,phi)
subr	tdmegeo	(xdme,ydme,zdme,r lat,r long,xgeo,ygeo,zgeo)
subr	tgeigeo	(xgei,ygei,zgei,xgeo,ygeo,zgeo)

type	module	arguments
subr	tgeigse	(xgei,ygei,zgei,xgse,ygse,zgse)
subr	tgeigsm	(xgei,ygei,zgei,xgsm,ygsm,zgsm)
subr	tgeigsq	(xgei,ygei,zgei,xgsq,ygsq,zgsq)
subr	tgeimag	(xgei,ygei,zgei,xmag,ymag,zmag)
subr	tgeisma	(xgei,ygei,zgei,xsma,ysma,zsma)
subr	tgeodme	(xgeo,ygeo,zgeo,r lat,r long,xdme,ydme,zdme)
subr	tgeogei	(xgeo,ygeo,zgeo,xgei,ygei,zgei)
subr	tgeogse	(xgeo,ygeo,zgeo,xgse,ygse,zgse)
subr	tgeogsm	(xgeo,ygeo,zgeo,xgsm,ygsm,zgsm)
subr	tgeogsq	(xgeo,ygeo,zgeo,xgsq,ygsq,zgsq)
subr	tgeomag	(xgeo,ygeo,zgeo,xmag,ymag,zmag)
subr	tgeosma	(xgeo,ygeo,zgeo,xsma,ysma,zsma)
subr	tgeovdh	(xgeo,ygeo,zgeo,r lat,r long,xvdh,yvdh,zvdh)
subr	tgsegei	(xgse,ygse,zgse,xgei,ygei,zgei)
subr	tgsegeo	(xgse,ygse,zgse,xgeo,ygeo,zgeo)
subr	tgsegsm	(xgse,ygse,zgse,xgsm,ygsm,zgsm)
subr	tgsegsq	(xgse,ygse,zgse,xgsq,ygsq,zgsq)
subr	tgsestr2	(xgse,ygse,zgse,rotx,roty,rotz,xsr2,ysr2,zsr2)
subr	tgsngei	(xgsm,ygsm,zgsm,xgei,ygei,zgei)
subr	tgsngeo	(xgsm,ygsm,zgsm,xgeo,ygeo,zgeo)
subr	tgsngse	(xgsm,ygsm,zgsm,xgse,ygse,zgse)
subr	tgsngsq	(xgsm,ygsm,zgsm,xgsq,ygsq,zgsq)
subr	tgsnmag	(xgsm,ygsm,zgsm,xmag,ymag,zmag)
subr	tgsmsma	(xgsm,ygsm,zgsm,xsma,ysma,zsma)
subr	tgsqgei	(xgsq,ygsq,zgsq,xgei,ygei,zgei)
subr	tgsqgeo	(xgsq,ygsq,zgsq,xgeo,ygeo,zgeo)
subr	tgsqgse	(xgsq,ygsq,zgsq,xgse,ygse,zgse)
subr	tgsqgsm	(xgsq,ygsq,zgsq,xgsm,ygsm,zgsm)
subr	tmaggei	(xmag,ymag,zmag,xgei,ygei,zgei)
subr	tmaggeo	(xmag,ymag,zmag,xgeo,ygeo,zgeo)
subr	tmaggsm	(xmag,ymag,zmag,xgsm,ygsm,zgsm)
subr	tmagsma	(xmag,ymag,zmag,xsma,ysma,zsma)
subr	tsmagei	(xsma,ysma,zsma,xgei,ygei,zgei)
subr	tsmageo	(xsma,ysma,zsma,xgeo,ygeo,zgeo)
subr	tsmagsm	(xsma,ysma,zsma,xgsm,ygsm,zgsm)
subr	tsmamag	(xsma,ysma,zsma,xmag,ymag,zmag)
subr	tsphcar	(r,teta,phi,x,y,z)
subr	tsr2gse	(xsr2,ysr2,zsr2,rotx,roty,rotz,xgse,ygse,zgse)
subr	tsr2mfa	(xsr2,ysr2,zsr2,bx,by,bz,rox,roy,roz,xm,ym,zm)
subr	tsr2sre	(xsr2,ysr2,spifre,spipha,deltaT,xsre,ysre)
subr	tsresr2	(xsre,ysre,spifre,spipha,deltaT,xsr2,ysr2)
subr	tvdhgeo	(xvdh,yvdh,zvdh,r lat,r long,xgeo,ygeo,zgeo)
func	modulo	(a,p)