

CORHEL-5.1.1-AFRL

February 24, 2014

Parameters for Generating Solution of the Solar Corona and/or Heliosphere

Name	Description	Default	Range	Units	Type	
cr_num	Carrington rotation number		1625 - current Carrington rotation number		Integer	Required, use with non-ADAPT maps
cr_ut	Universal date and time corresponding to a Carrington rotation number		1975-02-18T22:39 - current date and time		Date and time (YYYY-MM- DDThh:mm)	Required, use only with ADAPT maps
res	Resolution		low medium custom		String	Required
name	Unique name of simulation run		Any string less than 48 characters long		String	Required
model	Simulation model	corhel	corhel (Solar Corona and Heliospheric Models) cor (Solar Corona Model Only) hel (Heliospheric Model Only)		Integer	Optional
<i>* Use for restarting solar corona simulation model or running heliospheric simulation model only</i>						
cor_res	Resolution of the solar corona simulation model solution used as reference to drive the current simulation run	Resolution of current simulation run			String	Optional
cor_name	Unique name of the solar corona simulation model solution used as reference to drive the current simulation run				String	Required
cor_model	Solar corona simulation model	masp	masp (Polytropic MHD model using MAS code) mast (Thermodynamic MHD model using MAS code) mas47 (Polytropic MHD model using serial MAS47 code)		String	Optional

			wsa (Wang-Sheeley-Arge Potential Field and Current Sheet model using POT3D code)			
cor_bc_params_ file	User parameters file for generating solar corona input boundary conditions				Filename	Optional
cor_params_file	User parameters file for generating solar corona simulation model solution				Filename	Optional
Refer to the table below to view parameters for generating input boundary conditions of the solar corona						
Parameters for Generating Input Boundary Conditions						Optional
Refer to one of the tables below to view parameters for generating solution of the solar corona						
Parameters for Generating Polytropic MHD Solution Using MAS Code (-cor_model masp)						Optional
Parameters for Generating Thermodynamic MHD Solution Using MAS Code (-cor_model mast)						
Parameters for Generating Polytropic MHD Solution Using Serial MAS47 Code (-cor_model mas47)						
Parameters for Generating WSA Empirical Solution Using POT3D Code (-cor_model wsa)						
hel_model	Heliospheric simulation model	masip47	masip47 (MHD model using serial MAS-IP47 code)		String	Optional
hel_bc_params_ file	User parameters file for generating heliospheric input boundary conditions				Filename	Optional
hel_params_file	User parameters file for generating heliospheric simulation model solution				Filename	Optional
Refer to the table below to view parameters for generating input boundary conditions of the heliosphere						
Parameters for Generating Input Boundary Conditions						Optional
Refer to one of the tables below to view parameters for generating solution of the heliosphere						
Parameters for Generating MHD Solution Using Serial MAS-IP47 Code (-hel_model masip47)						Optional

Parameters for Generating Input Boundary Conditions of the Solar Corona

Name	Description	Default	Range	Units	Type	
cor_bc_obs	Observatory name from where the synoptic map file is downloaded or originated	kpo	adapt (ADAPT)		String	Optional
			gong (NSO/GONG)			
			kpo (Kitt Peak)			
			hmi (SDO/HMI)			
			mdi (SOHO/MDI)			
			mwo (Mount Wilson)			
			solis (NSO/SOLIS)			
			wsa (Wilcox)			
cor_bc_synmap_file	User supplied synoptic map file				Filename	Optional
<i>Mesh Interpolation (not used for Wilcox synoptic map)</i>						
cor_bc_nt	Number of theta mesh points used to interpolate synoptic map	180	[90,720]		Integer	Optional
cor_bc_np	Number of phi mesh points used to interpolate synoptic map	360	[90,720]		Integer	Optional
<i>Polefitting (not used for ADAPT and Wilcox synoptic map)</i>						
cor_bc_th0s	Lower boundary of theta in which the data is used to fit at the south pole	0.40	[0.00,PI/2.0]	radians	Decimal	Optional
cor_bc_th0n	Lower boundary of theta in which the data is used to fit at the north pole	0.40	[0.00,PI/2.0]	radians	Decimal	Optional
cor_bc_th1s	Upper boundary of theta in which the data is used to fit at the south pole	0.70	[cor_bc_th0s,PI/2.0]	radians	Decimal	Optional
cor_bc_th1n	Upper boundary of theta in which the data is used to fit at the north pole	0.70	[cor_bc_th0n,PI/2.0]	radians	Decimal	Optional
cor_bc_thrs	Upper boundary of theta in which the data is replaced by the fitted values at the south pole	0.40	[0.00,PI/2.0]	radians	Decimal	Optional
cor_bc_thrn	Upper boundary of theta in which the data is replaced by the fitted values at the north pole	0.40	[0.00,PI/2.0]	radians	Decimal	Optional
<i>Smoothing by Diffusion</i>						
cor_bc_visc	Uniform viscosity factor	1.00	[0.00,1.00]		Decimal	Optional

cor_bc_visc_file	User supplied viscosity factor file				Filename	Optional, override the non-uniform viscosity factors if all exist
cor_bc_visc_bgnd	Viscosity factor for the whole region of magnetic field		[0.00,1.00]		Decimal	Optional, used in conjunction
cor_bc_visc_pole	Viscosity factor for the polar fields region of magnetic field		[0.00,1.00]		Decimal	
cor_bc_pole_width	Angular width of the polar fields region in which the viscosity factor is set to <i>cor_bc_visc_pole</i>		[0.00,PI/2.0]	radians	Decimal	
cor_bc_time	Diffusion time to determine the amount of smoothing	0.002	[0.00,INF]		Decimal	Optional
cor_bc_br0_file	User supplied Br solar corona input boundary condition file				Filename	Optional

Parameters for Generating Polytropic MHD Solution of the Solar Corona Using MAS Code

Name	Description	Default	Range	Units	Type	
cor_mas_wc_limit	Maximum wall-clock time to run				Time (hh:mm:ss)	Optional
cor_mas_nprocs	Number of processors decomposition for computations in r,t,p	MPI_NPROCS (corhel.conf file)	[1, INF], [1, INF], [1, INF]		3-tuple integers	Optional
cor_mas_nr	Number of radial mesh points	61 (low)	[1, INF]		Integer	Optional
		101 (medium)				
		0 (custom)				Required
cor_mas_nt	Number of theta mesh points	71 (low)	[1, INF]		Integer	Optional
		101 (medium)				
		0 (custom)				Required
cor_mas_np	Number of phi mesh points	65 (low)	[1, INF]		Integer	Optional
		129 (medium)				
		0 (custom)				Required
cor_mas_rl	Outer radial boundary	30.00	[20.00, INF]	Rs	Decimal	Optional
cor_mas_tmax	Maximum time of simulation	120.00	[cor_mas_dtmax, 200.00]	MAS time units	Decimal	Optional
cor_mas_ntmax	Maximum number of time steps	1000000	[1, INF]		Integer	Optional
cor_mas_tpltxint	Interval of plot field diagnostics in Alfven times	120.00	[0.00, cor_mas_tmax]	MAS time units	Decimal	Optional
cor_mas_plotlist	List of output fields	br, bt, bp, jr, jt, jp, p, rho, t, vr, vt, vp	ar, at, ap, br, bt, bp, em, ep, eta, eta_uw, heat, jr, jt, jp, p, pres, rho, sifac, t, visc, vr, vt, vp, vr_old, vt_old, vp_old, Efr, Eft, EFp		List of strings	Optional
cor_mas_dtmax	Maximum time step	0.050	[0.0010, 1.0000]	MAS time units	Decimal	Optional
cor_mas_dtmin	Minimum time step	0.005	[0.0001, cor_mas_dtmax]	MAS time units	Decimal	Optional
cor_mas_slund	Lundquist number	1.00e+03 (low)	(0.00, INF]		Decimal	Optional
		5.00e+03 (medium)				
		0.00 (custom)				Required
		0.010 (low)				Optional

cor_mas_visc	Viscosity	0.002 (medium)	(0.00,INF]		Decimal	Optional
		0.000 (custom)				Required
cor_mas_gamma	Ratio of specific heats	1.05	(1.00,5.0/3.0]		Decimal	Optional
cor_mas_epscg	Convergence criterion for matrix inversion except for resistivity	1.00e-08	[0.00,INF]		Decimal	Optional
cor_mas_epscga	Convergence criterion for matrix inversion for resistivity	1.00e-12	[0.00,INF]		Decimal	Optional
cor_mas_ncgmax	Maximum number of iterations in matrix inversion	10000	[1,INF]		Integer	Optional
cor_mas_cfl	Fraction of the CourantFriedrichsLewy limit	0.40	(0.00,1.00)		Decimal	Optional
cor_mas_tbc0	Temperature at the inner radial boundary	1.80e+06	[1.40e+06,2.40e+06]	K	Decimal	Optional
cor_mas_rho0	Base density	2.00	[0.00,INF]	$\times 10^8 \text{ cm}^{-3}$	Decimal	Optional
<i>Field Line Mapping from the Outer Radial Boundary to the Inner Radial Boundary</i>						
cor_mas_mapfl_r1_r0_ds_over_rc	Step size as a fraction of radius of curvature	0.010	[0.001,INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_min	Minimum field line tracing step size	0.001	[0.001,INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_max	Maximum field line tracing step size	0.010	[0.010,1.000]		Decimal	Optional
cor_mas_mapfl_r1_r0_dsmult	Field line tracing step size multiplier	1.000	[1.000,INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_local_mesh_factor	Fraction of local mesh size to limit by	1.000	[1.000,INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ntss	Uniform theta mesh dimensions	180	[90,720]		Integer	Optional
cor_mas_mapfl_r1_r0_npss	Uniform phi mesh dimensions	360	[90,720]		Integer	Optional

Parameters for Generating Thermodynamic MHD Solution of the Solar Corona Using MAS Code

Name	Description	Default	Range	Units	Type	
cor_mas_wc_limit	Maximum wall-clock time to run				Time (hh:mm:ss)	Optional
cor_mas_nprocs	Number of processors decomposition for computations in r,t,p	MPI_NPROCS (corhel.conf file)	[1, INF], [1, INF], [1, INF]		3-tuple integers	Optional
cor_mas_nr	Number of radial mesh points	131 (low)	[1, INF]		Integer	Optional
		151 (medium)				
		0 (custom)				Required
cor_mas_nt	Number of theta mesh points	101 (low)	[1, INF]		Integer	Optional
		101 (medium)				
		0 (custom)				Required
cor_mas_np	Number of phi mesh points	151 (low)	[1, INF]		Integer	Optional
		182 (medium)				
		0 (custom)				Required
cor_mas_r1	Outer radial boundary	30.00	[20.00, INF]	Rs	Decimal	Optional
cor_mas_tmax	Maximum time of simulation	120.00	[cor_mas_dtmax, 200.00]	MAS time units	Decimal	Optional
cor_mas_ntmax	Maximum number of time steps	1000000	[1, INF]		Integer	Optional
cor_mas_tpltxtint	Interval of plot field diagnostics in Alfven times	120.00	[0.00, cor_mas_tmax]	MAS time units	Decimal	Optional
cor_mas_plotlist	List of output fields	br, bt, bp, em, ep, heat, jr, jt, jp, p, rho, t, vr, vt, vp	ar, at, ap, br, bt, bp, em, ep, eta, eta_uw, heat, jr, jt, jp, p, pres, rho, sifac, t, visc, vr, vt, vp, vr_old, vt_old, vp_old, Efr, Eft, EFp		List of strings	Optional
cor_mas_dtmax	Maximum time step	0.0050	[0.0010, 1.0000]	MAS time units	Decimal	Optional
cor_mas_dtmin	Minimum time step	0.0001	[0.0001, cor_mas_dtmax]	MAS time units	Decimal	Optional
cor_mas_slund	Lundquist number	5.00e+03 (low)	(0.00, INF]		Decimal	Optional
		5.00e+03 (medium)				
		0.00 (custom)				Required
		0.004 (low)				Optional

cor_mas_visc	Viscosity	0.004 (medium)	(0.00, INF]		Decimal	Optional
		0.000 (custom)				Required
cor_mas_epscg	Convergence criterion for matrix inversion except for resistivity	1.00e-09	[0.00, INF]		Decimal	Optional
cor_mas_epscga	Convergence criterion for matrix inversion for resistivity	1.00e-09	[0.00, INF]		Decimal	Optional
cor_mas_ncgmax	Maximum number of iterations in matrix inversion	10000	[1, INF]		Integer	Optional
cor_mas_cfl	Fraction of the CourantFriedrichsLewy limit	0.40	(0.00, 1.00)		Decimal	Optional
cor_mas_heat_model	Coronal heating model	1	[1, 2]		Integer	Optional
cor_mas_heat_params file	User parameters file for coronal heating model				Filename	Optional
<i>Field Line Mapping from the Outer Radial Boundary to the Inner Radial Boundary</i>						
cor_mas_mapfl_r1_r0_ds_over_rc	Step size as a fraction of radius of curvature	0.010	[0.001, INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_min	Minimum field line tracing step size	0.001	[0.001, INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_max	Maximum field line tracing step size	0.010	[0.010, 1.000]		Decimal	Optional
cor_mas_mapfl_r1_r0_dsmult	Field line tracing step size multiplier	1.000	[1.000, INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_local_mesh_factor	Fraction of local mesh size to limit by	1.000	[1.000, INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ntss	Uniform theta mesh dimensions	180	[90, 720]		Integer	Optional
cor_mas_mapfl_r1_r0_npss	Uniform phi mesh dimensions	360	[90, 720]		Integer	Optional

Coronal Heating Model 1 (-cor_mas_heat_model 1)						
<i>Exponential (Fast Wind) Heating</i>						
cor_mas_heat_1_fw_q0	Heat flux	Calculated based on Br_{r0}	[0.00, INF]	erg/cm ² /s	Decimal	Optional
cor_mas_heat_1_fw_lambda	Scale length	0.70	(0.00, INF]	Rs	Decimal	Optional
<i>Quiet Sun Heating</i>						
cor_mas_heat_1_qs_h_int	Volume-integrated heat	Calculated based on Br_{r0}	[0.00, INF]	erg/s	Decimal	Optional
cor_mas_heat_1_qs_lambda	Scale length	0.20	(0.00, INF]	Rs	Decimal	Optional
cor_mas_heat_1_qs_brmax	Neutral line coefficient	0.25	[-INF, INF]		Decimal	Optional

Active Region Heating						
cor_mas_heat_1_ar_h_int	Volume-integrated heat	Calculated based on Br_{r0}	[0.00, INF]	erg/s	Decimal	Optional
cor_mas_heat_1_ar_power	Power of B	1.00	[-INF, INF]		Decimal	Optional

Coronal Heating Model 2 (-cor_mas_heat_model 2)

Exponential (Fast Wind) Heating						
cor_mas_heat_2_fw_q0	Heat flux	Calculated based on Br_{r0}	[0.00, INF]	erg/cm ² /s	Decimal	Optional
cor_mas_heat_2_fw_lambda	Scale length	1.00	(0.00, INF]	Rs	Decimal	Optional

Quiet Sun and Active Region Heating						
cor_mas_heat_2_qsar_h_int	Volume-integrated heat	Calculated based on Br_{r0}	[0.00, INF]	erg/s	Decimal	Optional
cor_mas_heat_2_qsar_lambda	Scale length	0.06	(0.00, INF]	Rs	Decimal	Optional
cor_mas_heat_2_qsar_power	Power of B	1.00	[-INF, INF]		Decimal	Optional

Neutral Line Heating						
cor_mas_heat_2_nl_h_int	Volume-integrated heat	Calculated based on Br_{r0}	[0.00, INF]	erg/s	Decimal	Optional
cor_mas_heat_2_nl_lambda	Scale length	0.03	(0.00, INF]	Rs	Decimal	Optional
cor_mas_heat_2_nl_power	Power of B	1.00	[-INF, INF]		Decimal	Optional

Short-scale Exponential Heating						
cor_mas_heat_2_ss_q0	Heat flux	Calculated based on Br_{r0}	[0.00, INF]	erg/cm ² /s	Decimal	Optional
cor_mas_heat_2_ss_lambda	Scale length	0.03	(0.00, INF]	Rs	Decimal	Optional

Parameters for Generating Polytropic MAS Solution of the Solar Corona Using Serial MAS47 Code

Name	Description	Default	Range	Units	Type	
cor_mas_r1	Outer radial boundary	30.00	[20.00, INF]	Rs	Decimal	Optional
cor_mas_tmax	Maximum time of simulation	120.00	[cor_mas_dtmax, 200.00]	MAS time units	Decimal	Optional
cor_mas_ntmax	Maximum number of time steps	1000000	[1, INF]		Integer	Optional
cor_mas_tpltxtint	Interval of plot field diagnostics in Alfven times	120.00	[0.00, cor_mas_tmax]	MAS time units	Decimal	Optional
cor_mas_plotlist	List of output fields	br, bt, bp, jr, jt, jp, p, rho, t, vr, vt, vp	ar, at, ap, ari, ati, api, arr, atr, apr, br, bt, bp, er0, et0, ep0, et0ef, ep0ef, em, ep, eta, etacell, h1, jr, jt, jp, p, rho, rhor0, t, ub, visc, visccell, vr, vt, vp, vri, vti, vpi, vtr, vpr		List of strings	Optional
cor_mas_dtmax	Maximum time step	0.050	[0.0010, 1.0000]	MAS time units	Decimal	Optional
cor_mas_dtmin	Minimum time step	0.005	[0.0001, cor_mas_dtmax]	MAS time units	Decimal	Optional
cor_mas_slund	Lundquist number	1.00e+03	(0.00, INF]		Decimal	Optional
cor_mas_visc	Viscosity	0.010	(0.00, INF]		Decimal	Optional
cor_mas_gamma	Ratio of specific heats	1.05	(1.00, 5.0/3.0]		Decimal	Optional
cor_mas_epscg	Convergence criterion for matrix inversion except for resistivity	1.00e-08	[0.00, INF]		Decimal	Optional
cor_mas_epscga	Convergence criterion for matrix inversion for resistivity	1.00e-08	[0.00, INF]		Decimal	Optional
cor_mas_ncgmax	Maximum number of iterations in matrix inversion	5000	[1, INF]		Integer	Optional
cor_mas_cfl	Fraction of the CourantFriedrichsLewy limit	0.40	(0.00, 1.00)		Decimal	Optional
cor_mas_tbc0	Temperature at the inner radial boundary	1.80e+06	[1.40e+06, 2.40e+06]	K	Decimal	Optional
cor_mas_rho0	Base density	2.00	[0.00, INF]	$\times 10^8 \text{ cm}^{-3}$	Decimal	Optional
<i>Field Line Mapping from the Outer Radial Boundary to the Inner Radial Boundary</i>						
cor_mas_mapfl_r1_r0_ds_over_rc	Step size as a fraction of radius of curvature	0.010	[0.001, INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_min	Minimum field line tracing step size	0.001	[0.001, INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_max	Maximum field line tracing step size	0.010	[0.010, 1.000]		Decimal	Optional
cor_mas_mapfl_r1_r0_dsmult	Field line tracing step size multiplier	1.000	[1.000, INF]		Decimal	Optional
cor_mas_mapfl_r1_r0_ds_local_mesh_factor	Fraction of local mesh size to limit by	1.000	[1.000, INF]		Decimal	Optional

cor_mas_mapfl_ r1 r0 ntss	Uniform theta mesh dimensions	180	[90,720]		Integer	Optional
cor_mas_mapfl_ r1 r0 npss	Uniform phi mesh dimensions	360	[90,720]		Integer	Optional

Parameters for Generating WSA Empirical Solution of the Solar Corona Using POT3D Code

Name	Description	Default	Range	Units	Type	
<i>Potential Field Source Surface Model</i>						
cor_wsa_pfss_nprocs	Number of processors decomposition for computations in r,t,p	MPI_NPROCS (corhel.conf file)	[1,INF], [1,INF], [1,INF]		3-tuple integers	Optional
cor_wsa_pfss_nr	Number of radial mesh points	51 (low)	[1,INF]		Integer	Optional
		101 (medium)				Required
		0 (custom)				
cor_wsa_pfss_nt	Number of theta mesh points	47 (low)	[1,INF]		Integer	Optional
		92 (medium)				Required
		0 (custom)				
cor_wsa_pfss_np	Number of phi mesh points	92 (low)	[1,INF]		Integer	Optional
		182 (medium)				Required
		0 (custom)				
cor_wsa_pfss_rl	Source-surface radial boundary	2.5	(1.00,INF]	Rs	Decimal	Optional
cor_wsa_pfss_ncgmax	Maximum number of solver iterations	10000	[1,INF]		Integer	Optional
cor_wsa_pfss_epscg	Convergence criterion	1.00e-08	[0.00,INF]		Decimal	Optional
<i>Current Sheet Model</i>						
cor_wsa_cs_nprocs	Number of processors decomposition for computations in r,t,p	MPI_NPROCS (corhel.conf file)	[1,INF], [1,INF], [1,INF]		3-tuple integers	Optional
cor_wsa_cs_nr	Number of radial mesh points	51 (low)	[1,INF]		Integer	Optional
		101 (medium)				Required
		0 (custom)				
cor_wsa_cs_nt	Number of theta mesh points	47 (low)	[1,INF]		Integer	Optional
		92 (medium)				Required
		0 (custom)				
cor_wsa_cs_np	Number of phi mesh points	92 (low)	[1,INF]		Integer	Optional
		182 (medium)				

		0 (custom)				Required
cor_wsa_cs_r1	Outer radial boundary	30.00	(cor_wsa_pfss_r1,INF]	Rs	Decimal	Optional
cor_wsa_cs_ncgmax	Maximum number of solver iterations	10000	[1,INF]		Integer	Optional
cor_wsa_cs_epscg	Convergence criterion	1.00e-08	[0.00,INF]		Decimal	Optional
<i>Field Line Mapping from the Outer Radial Boundary to the Source Surface Radial Boundary</i>						
cor_wsa_mapfl_r1_rss_ds_over_rc	Step size as a fraction of radius curvature	0.010	[0.001,INF]		Decimal	Optional
cor_wsa_mapfl_r1_rss_ds_min	Minimum field line tracing step size	0.001	[0.001,INF]		Decimal	Optional
cor_wsa_mapfl_r1_rss_ds_max	Maximum field line tracing step size	0.010	[0.010,1.000]		Decimal	Optional
cor_wsa_mapfl_r1_rss_dsmult	Field line tracing step size multiplier	1.000	[1.000,INF]		Decimal	Optional
cor_wsa_mapfl_r1_rss_ds_local_mesh_factor	Fraction of local mesh size to limit by	1.000	[1.000,INF]		Decimal	Optional
cor_wsa_mapfl_r1_rss_ntss	Uniform theta mesh dimensions	180	[90,720]		Integer	Optional
cor_wsa_mapfl_r1_rss_npss	Uniform phi mesh dimensions	360	[90,720]		Integer	Optional
<i>Field Line Mapping from the Source Surface Radial Boundary to the Photosphere</i>						
cor_wsa_mapfl_rss_r0_ds_over_rc	Step size as a fraction of radius curvature	0.010	[0.001,INF]		Decimal	Optional
cor_wsa_mapfl_rss_r0_ds_min	Minimum field line tracing step size	0.001	[0.001,INF]		Decimal	Optional
cor_wsa_mapfl_rss_r0_ds_max	Maximum field line tracing step size	0.010	[0.010,1.000]		Decimal	Optional
cor_wsa_mapfl_rss_r0_dsmult	Field line tracing step size multiplier	1.000	[1.000,INF]		Decimal	Optional
cor_wsa_mapfl_rss_r0_ds_local_mesh_factor	Fraction of local mesh size to limit by	1.000	[1.000,INF]		Decimal	Optional
cor_wsa_mapfl_rss_r0_ntss	Uniform theta mesh dimensions	180	[90,720]		Integer	Optional
cor_wsa_mapfl_rss_r0_npss	Uniform phi mesh dimensions	360	[90,720]		Integer	Optional

Parameters for Generating Input Boundary Conditions of the Heliosphere

Name	Description	Default	Range	Units	Type	
<i>* Set only when using solar corona MAS solution</i>						
hel_bc_mas_br_r0	Radius to represent the magnetic field at the inner radial boundary	20.00	[15.00,cor_mas_r1]	Rs	Decimal	Optional
hel_bc_getv_model	Empirical solar wind model	psi (when using solar corona MAS solution)	psi (Predictive Science Inc. Ad Hoc Model)		String	Optional
		wsa (when using solar corona WSA solution)	wsa (Wang-Sheeley-Arge model) Note: can only be used with solar corona WSA solution			
hel_bc_getv_params_file	User parameters file for empirical solar wind model				Filename	Optional

PSI Ad Hoc Empirical Solar Wind Model (-hel_bc_getv_model psi)						
hel_bc_getv_psi_vslow	Slow wind speed	250.00	[-INF,INF]	km/s	Decimal	Optional
hel_bc_getv_psi_vfast	Fast wind speed	650.00	[-INF,INF]	km/s	Decimal	Optional
hel_bc_getv_psi_eps	Coronal hole distance parameter	0.050	[-INF,INF]		Decimal	Optional
hel_bc_getv_psi_width	Coronal hole distance width	0.025	[-INF,INF]		Decimal	Optional
hel_bc_getv_psi_rhofast	Density of fast wind	152.00	(0.00,INF]	cm ⁻³	Decimal	Optional
hel_bc_getv_psi_tfast	Temperature of fast wind	1.85e+06	[0.00,INF]	K	Decimal	Optional

WSA Empirical Solar Wind Model (-hel_bc_getv_model wsa)						
hel_bc_getv_wsa_vslow	Slow wind speed	250.00	[-INF,INF]	km/s	Decimal	Optional
hel_bc_getv_wsa_vfast	Fast wind speed	680.00	[-INF,INF]	km/s	Decimal	Optional
hel_bc_getv_wsa_vmax	Maximum wind speed	800.00	[-INF,INF]	km/s	Decimal	Optional
hel_bc_getv_wsa_ef_power	Expansion factor power	1.0/3.0	[-INF,INF]		Decimal	Optional
hel_bc_getv_wsa_chd_mult_fac	Coronal hole distance multiplier	0.80	[-INF,INF]		Decimal	Optional
hel_bc_getv_wsa_chd_arg_fac	Coronal hole distance factor	0.25	[-INF,INF]		Decimal	Optional

hel_bc_getv_wsa_chd_power	Coronal hole distance power	4.00	$[-\text{INF}, \text{INF}]$		Decimal	Optional
hel_bc_getv_wsa_rhofast	Density of fast wind	152.00	$(0.00, \text{INF}]$	cm^{-3}	Decimal	Optional
hel_bc_getv_wsa_tfast	Temperature of fast wind	1.85e+06	$[0.00, \text{INF}]$	K	Decimal	Optional

Parameters for Generating MHD Solution of the Heliosphere Using Serial MAS-IP47 Code

Name	Description	Default	Range	Units	Type	
hel_masip_gamma	Ratio of specific heats	1.50	[1.00,5.0/3.0]		Decimal	Optional
hel_masip_tmax	Maximum time of simulation	600.00	[hel_masip_dtmax,INF]	MAS time units	Decimal	Optional
hel_masip_ntmax	Maximum number of time steps	100000	[1,INF]		Integer	Optional
hel_masip_dtmax	Maximum time step	5.000	[0.010,10.000]	MAS time units	Decimal	Optional
hel_masip_dtmin	Minimum time step	0.010	[0.001,hel_masip_dtmax]	MAS time units	Decimal	Optional
hel_masip_slund	Lundquist number	1.00e+03	[0.00,INF]		Decimal	Optional
hel_masip_visc	Viscosity	0.010	[0.00,INF]		Decimal	Optional
hel_masip_r0	Inner radial boundary	30.00	[20.00,INF]	Rs	Decimal	Optional
hel_masip_r1	Outer radial boundary	236.46	(hel_masip_r0,INF]	Rs	Decimal	Optional
hel_masip_tpltxint	Interval of plot field diagnostics in Alfven times	600.00	[0.00,hel_masip_tmax]	MAS time units	Decimal	Optional
hel_masip_plotlist	List of output fields	br,bt,bp, jr,jt,jp, p,rho,t, vr,vt,vp	ar,at,ap,ari,ati,api, arr,atr,apr,br,bt,bp, er0,et0,ep0,et0ef, ep0ef,em,ep,eta, etacell,h1,jr,jt,jp,p, rho,rhor0,t,ub,visc, visccell,vr,vt,vp,vri, vti,vpi,vtr,vpr		List of strings	Optional
hel_masip_tfast	Temperature of fast wind	1.85e+06	[0.00,INF]	K	Decimal	Optional
hel_masip_rhofast	Density of fast wind	1.52e-06	(0.00,INF]	MAS electron density units	Decimal	Optional
hel_masip_omega_rot	Angular velocity	0.004144	[0.00,INF]		Decimal	Optional