MicroHH 1.6 cheat sheet

[advec] Advection

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swadvec	swspatialorder	0	disable advection
		2	2nd-order advection
		2i4	2nd-order advection with 4th-order interpolation
		4	4th-order advection (high accuracy)
		4m	4th-order advection (energy conserving)
cflmax	1.0		

[boundary] Boundary conditions

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swboundary	default	default	fully resolved boundaries (smooth wall)
		surface	MOST based wall model
		patch	patches, resolved boundary
		surface_patch	patches, MOST boundary
mbcbot	n/a	noslip	no-slip bottom boundary condition
		freeslip	free-slip bottom boundary condition
		ustar	fixed ustar bottom boundary condition
mbctop	n/a	noslip	no-slip top boundary condition
		freeslip	free-slip top boundary condition
sbcbot[]	n/a	dirichlet	fixed bottom value boundary condition
		neumann	fixed bottom gradient (only valid for *default*)
		flux	fixed bottom flux boundary condition
sbcbot[]	n/a	dirichlet	fixed top value boundary condition
		neumann	fixed top gradient (only valid for *default*)
		flux	fixed top flux boundary condition
sbot[]	n/a		value of the bottom boundary condition
stop[]	n/a		value of the top boundary condition

Only for swboundary = *surface*:

z0m	n/a		roughness length of momentum [m]
z0h	n/a		roughness length of scalars [m]
ustar	n/a		value of the friction velocity [m s^{-1}]

Only for swboundary = *patch* or *surface_patch*:

patch_dim	2		patch direction (1=x, 2=x and y)
patch_xh	1		heterogeneity size (x) [m]
patch_xr	1		patch size (x) [m]
patch_xi	0		interface sharpness (x) [m]
patch_xoffs	0		offset patch within heterogeneity (x) [m]
patch_yh	1		heterogeneity size (y) [m]
patch_yr	1		patch size (y) [m]
patch_yi	0		interface sharpness (y) [m]
patch_yoffs	0		offset patch within heterogeneity (y) [m]

[buffer] Buffer layer

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swbuffer	0	0	disable buffer layer at the top of the domain
		1	enable buffer layer at the top of the domain
swupdate	0	0	use the initial profile as the buffer reference
		1	take the actual mean profile as the buffer reference
zstart	n/a		starting height for buffer zone [m]
sigma	n/a		damping time scale of the buffer layer [s^{-1}]
beta	2.		exponent of the damping increase with height [-]

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NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION

[cross] Cross-section

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swcross	0	0	disable cross sections
		1	enable cross sections
sampletime	n/a		sampling time step [s]
xz	empty		list of y locations at which xz-crosssection are taken
yz	empty		list of x locations at which yz-crosssection are taken
xy	empty		list of z locations at which xy-crosssection are taken
crosslist	empty		list of cross-section variables

[diff] Diffusion

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swdiff	swspatialorder	0	disable diffusion
		2	2nd-order diffusion
		4	4th-order diffusion
		smag2	2nd-order Smagorinsky eddy diffusion
dnmax	0.4		maximum diffusion number for numerical scheme

Only for swdiff = *smag2*:

cs	0.23		Smagorinsky constant
tPr	1./3.		turbulent Prandtl number

[dump] 3D output

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swdump	0	0	disable writing 3d diagnostic fields
		1	enable writing 3d diagnostic fields
sampletime	n/a		sampling time step [s]
dumplist	empty		list of diagnostic 3D fields

[fields] Fields

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
slist	empty		list of passive scalars
visc	n/a		viscosity [m^2 s^{-1}]
svisc[]	n/a		diffusivity of scalars [m^2 s^{-1}]
rndseed	2		seed of the randomnizer
rndamp[]	0.		amplitude of random perturbations [variable unit]
rndz	0.		maximum height of perturbations [m]
rndexp	2.		exponent of decay of perturbation
vortexnpair	0		number of rotating vortex pairs
vortexamp	1.e-3		amplitude of vortex pairs
vortexaxis	x		axis around which the vortices are evolving

[force] Large scale forcings

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swlspres	0	0	disable large scale pressure forcing
		geo	use geostrophic wind as large scale pressure force
		uflux	fix the mean flow velocity in the x-direction
swls	0	0	disable large scale source/sink
		1	enable large scale source/sink
lslist	empty		list of prognostic variables having large scale source/sink
swwls	0	0	disable large scale vertical velocity
		1	enable large scale vertical velocity
fc	n/a		coriolis parameter [s^{-1}]
uflux	n/a		mean flow velocity [m s^{-1}]

[grid] Grid

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
xsize	n/a		x-size of domain [m]
ysize	n/a		y-size of domain [m]
zsize	n/a		z-size of domain [m]
itot	n/a		number of grid points in x-direction
jtot	n/a		number of grid points in y-direction
ktot	n/a		number of grid points in z-direction
swspatialorder	n/a	2	2nd-order spatial discretization
		4	4th-order spatial discretization
utrans	0.		translation velocity in x-direction [m s^{-1}]
vtrans	0.		translation velocity in y-direction [m s^{-1}]

[master] Application control and communication

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
npx	1		number of processors in x-direction
npy	1		number of processors in y-direction
wallclocklimit	1E8		maximum run duration in wall clock hours [h]

[pres] Pressure

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swpres	swspatialorder	0	disable pressure solver
		2	2nd-order pressure solver (tridiagonal solver)
		4	4th-order pressure solver (heptadiagonal solver)

[stat] Statistics

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swstats	0	0	disable statistics
sampletime	n/a		sampling time step [s]
masklist	empty	wplus	conditional statistics $w > 0$
		wmin	conditional statistics $w < 0$
		ql	conditional statistics $q_l > 0$
		qlcore	conditional statistics $q_l > 0$ and $B > 0$

[thermo] Thermodynamics

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
swthermo	0	0	disable thermodynamics
		dry	dry thermodynamics (*"th"*)
		moist	moist thermodynamics (*"thl"* + *"qt"*)

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NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
		buoy	buoyancy thermodynamics including option for slope (*"b"*)
alpha	n/a		optional slope angle [radians]
N2	n/a		Brunt-Väisälä frequency [1/s] (req. with alpha)
swbasestate	n/a	boussinesq	constant density and reference temperature
		anelastic	anelastic approximation (Bannon, 1996)
thvref0	n/a		reference virtual potential temperature [K] (moist Boussinesq)
thref0	n/a		reference potential temperature [K] (dry Boussinesq)
ps	n/a		surface pressure [Pa]
swupdatebas-estate	n/a	0	use initial hydrostatic pressure in q_l calculation
		1	update hydrostatic pressure in q_l calculation

[timeloop] Time

NAME	DEFAULT VALUE	OPTIONS	DESCRIPTION
starttime	n/a		start time of simulation [s]
endtime	n/a		end time of simulation [s]
savetime	n/a		interval for saving restart files [s]
postproctime	n/a		time step of postprocessing procedure
adaptivestep	true	true	enable adaptive time stepping
		false	disable adaptive time stepping
dt	0.1		time step [s] (only valid if adaptivestep = false)
dtmax	dbig		maximum time step [s]
rkorder	3	3	Runge-Kutta 3rd-order accuracy, 3 steps
		4	Runge-Kutta 4th-order accuracy, 5 steps
outputiter	10		frequency of diagnostic output to <casename>.out
iotimeprec	0		precision of saving of time in 10-power (i.e. -1 = 0.1, etc.)