Output File Formats

Summary Files

Summary data for all modes found by GYRE are stored in an HDF5-format file. The `summary_item_names` parameter controls which variables are written to the file; it is a comma-separated list of item names drawn from the table below. Scalar items are stored as attributes, while 1-D array items are stored as datasets.

Variable	Units	Item Name	Item type[1]	Definition
ℓ	—	`l`	integer dataset	Harmonic degrees
$n_{\rm p}$	—	`n_p`	integer dataset	p-mode radial orders
$n_{\rm g}$	—	`n_g`	integer dataset	g-mode radial orders
ω	—	`omega`	complex dataset	Dimensionless angular eigenfrequencies
f	*varies*[2]	`freq`	complex dataset	Generic eigenfrequencies
E	—	`E`	real dataset	Normalized mode inertias[3]
K	GM_*^2/R_*	`K`	real dataset	Kinetic energies
W	GM_*^2/R_*	`W`	real dataset	Works
${M_*}^4$	g	`M_star`	real attribute	Stellar mass
${R_*}^4$	cm	`R_star`	real attribute	Stellar radius
${L_*}^4$	$\mathrm{erg\,s^{-1}}$	`L_star`	real attribute	Stellar luminosity
${n_{\rm poly}}^5$	—	`n_poly`	real attribute	Polytropic index

Table 1: Output data for summary files

[1] Real attributes and datasets are written with type `H5T_IEEE_F64LE`. Integer attributes and datasets are written with type `H5T_STD_I64LE`. Complex attributes and datasets are written as a compound type, composed of a real component `re` and an imaginary component `im`, both with type `H5T_IEEE_F64LE`.

[2] The units of f depend on the value of the `freq_units` field in the `&output` namelist.

[3] See Christensen-Dalsgaard (2012, his eqn. 13).

[4] Only available when `coeffs_type` is `EVOL`.

[5] Only available when `coeffs_type` is `POLY`.

Mode Files

Detailed data for each individual mode found by GYRE are stored in HDF5-format files. The `mode_item_names` parameter controls which variables are written to the files; it is a comma-separated list of item names drawn from the table below. Scalar items are stored as attributes, while 1-D array items are stored as datasets.

Variable	Units	Item Name	Item type[1]	Definition
n	—	`n`	integer attribute	Number of grid points
ℓ	—	`l`	integer attribute	Harmonic degree
$n_{\rm p}$	—	`n_p`	integer attribute	p-mode radial order
$n_{\rm g}$	—	`n_g`	integer attribute	g-mode radial order
ω	—	`omega`	complex attribute	Dimensionless angular eigenfrequency
f	*varies*[2]	`freq`	complex attribute	Generic eigenfrequency
E	—	`E`	real attribute	Normalized mode inertia[3]
K	GM_*^2/R_*	`K`	real attribute	Kinetic energy
W	GM_*^2/R_*	`dW_dx`	real attribute	Work
x	—	`x`	real dataset	r/R_*
V	—	`V`	real dataset	$-\mathrm{d}\ln p/\mathrm{d}\ln r$
A^*	—	`As`	real dataset	$\Gamma_1^{-1}\mathrm{d}\ln p/\mathrm{d}\ln r - \mathrm{d}\ln\rho/\mathrm{d}\ln r$
U	—	`U`	real dataset	$\mathrm{d}\ln M_r/\mathrm{d}\ln r$
c_1	—	`c_1`	real dataset	$(r/R_*)^3(M_*/M_r)$
Γ_1	—	`Gamma_1`	real dataset	$(\partial\ln p/\partial\ln\rho)_{\rm ad}$
ξ_r	R_*	`xi_r`	complex dataset	Radial displacement perturbation
ξ_h	R_*	`xi_h`	complex dataset	Horizontal displacement perturbation
ϕ'	GM_*/R_*	`phip`	complex dataset	Eulerian potential perturbation
$\mathrm{d}\phi'/\mathrm{d}x$	GM_*/R_*	`dphip_dx`	complex dataset	Eulerian radial gravity perturbation
δS^4	c_p	`delS`	complex dataset	Lagrangian specific entropy perturbation
$\delta L^{4,5}$	L_*	`delL`	complex dataset	Lagrangian luminosity perturbation
$\mathrm{d}K/\mathrm{d}x$	GM_*^2/R_*	`dK_dx`	real dataset	Differential kinetic energy
$\mathrm{d}W/\mathrm{d}x$	GM_*^2/R_*	`dW_dx`	real dataset	Differential work
${M_*}^4$	g	`M_star`	real attribute	Stellar mass
${R_*}^4$	cm	`R_star`	real attribute	Stellar radius
${L_*}^4$	$\mathrm{erg\,s^{-1}}$	`L_star`	real attribute	Stellar luminosity
w^4	—	`w`	real dataset	$M_r/(M_*-M_r)$
p^4	$\mathrm{dyn\,cm^{-2}}$	`p`	real dataset	Total pressure
ρ^4	$\mathrm{g\,cm^{-3}}$	`rho`	real dataset	Density
T^4	K	`T`	real dataset	Temperature

Table 2: Output data for mode files

References

Christensen-Dalsgaard, J., 2012, in ASP Conf. Ser., Vol. 462, *Progress in Solar/Stellar Physics with Helio- and Asteroseismology*, Shibahashi, H., Takata, M., Lynas-Gray, A. E., eds., 503