GYRE Stellar Model (GSM) Format

GSM-format files store data describing a stellar model in an HDF5-format file. The attributes of the root group contain global stellar parameters, while 1-D datasets contained within the root group specify the structure data on a grid of n points extending from center to surface. These attributes and datasets are defined as follows:

Variable	Object name	(A)ttribute / (D)ataset	Object datatype	Definition
R_*	`R_star`	A	`H5T_IEEE_F64LE`	Stellar radius (cm)
M_*	`M_star`	A	`H5T_IEEE_F64LE`	Stellar mass (g)
L_*	`L_star`	A	`H5T_IEEE_F64LE`	Stellar luminosity ($\mathrm{erg\,s^{-1}}$)
n	`n`	A	`H5T_STD_I64LE`	Number of grid points
r	`r`	D	`H5T_IEEE_F64LE`	Radius (cm)
w	`w`	D	`H5T_IEEE_F64LE`	$M_r/(M_* - M_r)$
p	`p`	D	`H5T_IEEE_F64LE`	Total pressure ($\mathrm{dyn\,cm^{-2}}$)
T	`T`	D	`H5T_IEEE_F64LE`	Temperature (K)
ρ	`rho`	D	`H5T_IEEE_F64LE`	Density ($\mathrm{g\,cm^{-2}}$)
N^2	`N2`	D	`H5T_IEEE_F64LE`	Brunt-Väisälä frequency squared ($\mathrm{s^{-2}}$)
Γ_1	`Gamma_1`	D	`H5T_IEEE_F64LE`	$(\partial \ln p/\partial \ln \rho)_{\mathrm{ad}}$
∇_{ad}	`nabla`	D	`H5T_IEEE_F64LE`	$(\mathrm{d} \ln T/\mathrm{d} \ln p)_{\mathrm{ad}}$
δ	`delta`	D	`H5T_IEEE_F64LE`	$-(\partial \ln \rho/\partial \ln T)_p$
∇	`nabla`	D	`H5T_IEEE_F64LE`	$\mathrm{d} \ln T/\mathrm{d} \ln p$
ϵ	`epsilon`	D	`H5T_IEEE_F64LE`	energy generation rate ($\mathrm{erg}\,s^{-1}\,\mathrm{g^{-1}}$)
ϵ_T	`epsilon_T`	D	`H5T_IEEE_F64LE`	$(\partial \epsilon/\partial \ln T)_\rho$ ($\mathrm{erg}\,s^{-1}\,\mathrm{g^{-1}}$)
ϵ_ρ	`epsilon_rho`	D	`H5T_IEEE_F64LE`	$(\partial \epsilon/\partial \ln \rho)_T$ ($\mathrm{erg}\,s^{-1}\,\mathrm{g^{-1}}$)
κ	`kappa`	D	`H5T_IEEE_F64LE`	opacity ($\mathrm{cm^2\,g^{-1}}$)
κ_T	`kappa_T`	D	`H5T_IEEE_F64LE`	$(\partial \ln \kappa/\partial \ln T)_\rho$
κ_ρ	`kappa_rho`	D	`H5T_IEEE_F64LE`	$(\partial \ln \kappa/\partial \ln \rho)_T$
Ω_{rot}	`Omega_rot`	D	`H5T_IEEE_F64LE`	Rotation angular velocity ($\mathrm{rad\,s^{-1}}$)