1 Field Variables

Symbol	SILO variable name	description
ρ_i	rho_1, rho_2, rho_3, etc.	ith density fraction.
s_i	sx, sy, sz	inertial frame momentum
z_i	zx, zy, zz	inertial frame spin momentum relative to cell center
g_i	gx, gy, gz	gravitational acceleration
ϕ	phi	gravitational acceleration
E	egas	kinetic + internal energy density
τ	tau	entropy tracer

2 Other Variable

Symbol	SILO variable name	description
μ_i	A[i-1]	atomic mass number of ith fraction
Z_i	Z[i-1]	electron number of ith fraction
Ω	omega	rotation frequency of the grid

3 Derived Expressions

total mass density

$$\rho := \Sigma_{i=1}^{N} \rho_i \tag{1}$$

x - velocity relative to grid

$$v_x := \frac{s_x}{\rho} + y\Omega \tag{2}$$

y - velocity relative to grid

$$v_y := \frac{s_y}{\rho} - x\Omega \tag{3}$$

z - velocity relative to grid

$$v_z := \frac{s_z}{\rho} \tag{4}$$

internal gas energy density

$$e := \begin{cases} E - \frac{1}{2}\frac{s^2}{rho} & \text{if } E - \frac{1}{2}\frac{s^2}{rho} > 0.001E \\ \tau^{\gamma} & \text{else} \end{cases} \tag{5}$$

number density of ith fraction (ions + electrons)

$$n_i := \frac{\rho_i}{\mu_i m_H}\left(1 + Z_i\right) \tag{6}$$

total number density

$$n := \Sigma_{i=1}^{N} \tag{7}$$

temperature

$$T := \frac{1}{\gamma - 1} \frac{e}{n} \tag{8}$$

pressure

$$P := (\gamma - 1)\, e \tag{9}$$