1 Non-dimensional Forms

The IAPWS-95 document possesses a table the summarizes the Helmholtz free energy function's relationships to a number of thermodynamic properties. These relationships, as programmed into the $\mathbb{WP}$, are a bit different from those documented since constant, scalar non-dimensional properties are preferable and desired. The table below summarizes the relations from the IAPWS and those used in the $\mathbb{WP}$.

Table 1:

Property	IAPWS-95 Relation	$\mathbb{WP}$ Relation
Pressure	$\frac{P}{R\rho T} = 1 + \delta\frac{\partial\phi^{\mathrm{r}}}{\partial\delta}$	$\frac{P}{R\rho_{\mathrm{c}}T_{\mathrm{c}}} = \left[1 + \delta\frac{\partial\phi^{\mathrm{r}}}{\partial\delta}\right]\frac{\delta}{\tau}$
Internal Energy	$\frac{i}{RT} = \tau\frac{\partial\phi}{\partial\tau}$	$\frac{i}{RT_{\mathrm{c}}} = \frac{\partial\phi}{\partial\tau}$
Entropy	$\frac{s}{R} = \tau\frac{\partial\phi}{\partial\tau} - \phi$	$\frac{s}{R} = \tau\frac{\partial\phi}{\partial\tau} - \phi$
Enthalpy	$\frac{h}{RT} = 1 + \tau\frac{\partial\phi}{\partial\tau} + \delta\frac{\partial\phi^{\mathrm{r}}}{\partial\delta}$	$\frac{h}{RT_{\mathrm{c}}} = \frac{1}{\tau}\left[1 + \tau\frac{\partial\phi}{\partial\tau} + \delta\frac{\partial\phi^{\mathrm{r}}}{\partial\delta}\right]$