Notes on the function
gsw_dynamic_enthalpy_CT_exact(SA,CT,p)

Young (2010) has defined dynamic enthalpy \( h^1 \) to be the difference between enthalpy and potential enthalpy, that is, \( h - h^0 = h - c_p^0 \Theta \). Hence dynamic enthalpy \( h^1 \) is also equal to the following pressure integral of specific volume for a seawater parcel which does not exchange heat or salt as its pressure is changed during the integration,

\[
\hat{h}^1(S_A, \Theta, p) = h(S_A, \Theta, p) - c_p^0 \Theta = \int_{P_h}^P \hat{v}(S_A, \Theta, p') dP',
\]

(1)

The lower limit of the integration is \( P_h = 101\,325 \) Pa and the pressure integral is done with pressure in Pa (not dbar). Enthalpy and dynamic enthalpy have units of \( 1 \) J kg\(^{-1}\).

This function, \( \text{gsw_dynamic_enthalpy_CT_exact}(SA, CT, p) \), evaluates dynamic enthalpy \( h^1 \) in terms of the input variables Absolute Salinity \( S_A \), Conservative Temperature \( \Theta \) and pressure \( p \). This function uses the full TEOS-10 Gibbs function \( g(S_A, t, p) \) of IOC et al. (2010), being the sum of the IAPWS-09 and IAPWS-08 Gibbs functions.

This function is essentially the following calls to two other GSW functions,

\[
t = \text{gsw_t_from_CT}(SA, CT, p);
dynamic_enthalpy_CT_exact = \text{gsw_enthalpy_t_exact}(SA, t, p) - c_p^0*CT;
\]

References


