2.17 Sound speed

The speed of sound in seawater c is given by

$$c = c(S_A, t, p) = \left(\partial P/\partial \rho|_{S_A,\eta}\right)^{0.5} = (\rho\kappa)^{-0.5} = g_P\left(g_{TT}/\left[g_{TP}^2 - g_{TT}g_{PP}\right]\right)^{0.5}. \quad (2.17.1)$$

Note that in these expressions in Eqn. (2.17.1), since sound speed is in $\mathrm{m\,s^{-1}}$ and density has units of $\mathrm{kg\,m^{-3}}$ it follows that the pressure of the partial derivatives must be in Pa and the isentropic compressibility κ must have units of $\mathrm{Pa^{-1}}$. The sound speed c produced by both the SIA and the GSW software libraries (appendices M and N) has units of $\mathrm{m\,s^{-1}}$.