Symmetry properties [nln30]

Response function for Hermitian A is real and vanishes for $t < 0$:

$$\tilde{\chi}_{AA}(t) = \frac{\imath}{\hbar}\theta(t)\langle[A(t), A]\rangle = \tilde{\chi}'_{AA}(t) + \imath\tilde{\chi}''_{AA}(t).$$

Reactive part is real and symmetric:

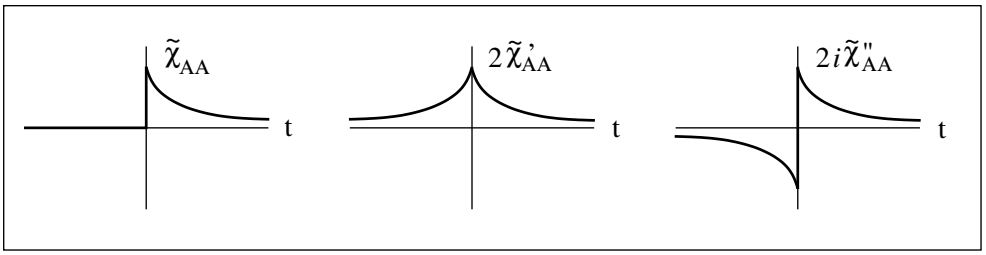
$$\tilde{\chi}'_{AA}(t) = \frac{1}{2}\big[\tilde{\chi}_{AA}(t) + \tilde{\chi}_{AA}(-t)\big] = \frac{\imath}{2\hbar}\mathrm{sgn}(t)\langle[A(t), A]\rangle.$$

Dissipative part is imaginary and antisymmetric:

$$\tilde{\chi}''_{AA}(t) = \frac{1}{2\imath}\big[\tilde{\chi}_{AA}(t) - \tilde{\chi}_{AA}(-t)\big] = \frac{1}{2\hbar}\langle[A(t), A]\rangle.$$

Response function is determined by its reactive or dissipative part alone:

$$\tilde{\chi}_{AA}(t) = 2\theta(t)\tilde{\chi}'_{AA}(t) = 2\imath\theta(t)\tilde{\chi}''_{AA}(t).$$



Generalized susceptibility is complex:

$$\chi_{AA}(\omega) = \chi'_{AA}(\omega) + \imath\chi''_{AA}(\omega).$$

Real part is symmetric:

$$\chi'_{AA}(\omega) = \frac{1}{2}\big[\chi_{AA}(\omega) + \chi_{AA}(-\omega)\big] = \chi'_{AA}(-\omega).$$

Imaginary part is antisymmetric:

$$\chi''_{AA}(\omega) = \frac{1}{2\imath}\big[\chi_{AA}(\omega) - \chi_{AA}(-\omega)\big] = -\chi''_{AA}(-\omega).$$