

Erratum: Mori-Zwanzig projection operator formalism: Generalized Langevin equation dynamics of a classical system perturbed by an external generalized potential and far from equilibrium **[Phys. Rev. E 111, 034130 (2025)]**

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In Sec. III B (p. 4), the Green's function used to solve Eq. (22) during a derivation of the time-convolution equation was written in a time-translation-invariant form $\hat{G}(t-\tau) = \theta(t-\tau)e_R^{\int_0^{t-\tau} ds iL(\Gamma_0, s)\mathcal{Q}^0}$, which is applicable only to a system perturbed by a stationary field when the Liouvillian iL does not depend explicitly on time t . A general expression applicable to an explicitly time-dependent Liouvillian $iL(\Gamma_0, t)$ is

$$\hat{G}(t, \tau) = \theta(t-\tau)e_R^{\int_\tau^t ds iL(\Gamma_0, s)\mathcal{Q}^0} = \theta(t-\tau)e_R^{\int_0^{t-\tau} ds iL(\Gamma_0, s+\tau)\mathcal{Q}^0}.$$

This leads the orthogonal (projected) propagator $U_R^{\mathcal{Q}}$ [Eq. (26)] to acquire an explicit dependence on time t . The new expression for the Green's function requires a correction to Eqs. (23), (25), and (26) and does not affect the rest of the paper. The correct version of Eq. (23) is

$$\begin{aligned} U_R(t)\mathcal{Q}^0 &= \hat{y}(t) + \int_0^\infty d\tau U_R(\tau)\mathcal{P}^0 iL(\Gamma_0, \tau)\mathcal{Q}^0 \hat{G}(t, \tau) \\ &= \mathcal{Q}^0 e_R^{\int_0^t ds iL(\Gamma_0, s)\mathcal{Q}^0} + \int_0^t d\tau U_R(\tau)\mathcal{P}^0 iL(\Gamma_0, \tau)\mathcal{Q}^0 e_R^{\int_0^{t-\tau} ds iL(\Gamma_0, s+\tau)\mathcal{Q}^0}. \end{aligned} \quad (23)$$

The part of the sentence containing Eqs. (25) and (26) should read as follows:

$$\delta O^{\mathcal{Q}}(\tau, t) = e_R^{\int_0^\tau ds \mathcal{Q}^0 iL(\Gamma_0, s+t-\tau)} [\mathcal{Q}^0 iL(\Gamma_0, t) O(\Gamma_0, t)] = U_R^{\mathcal{Q}}(\tau) \delta O^{\mathcal{Q}}(0, t), \quad (25)$$

where we introduced the projected Liouville propagator

$$U_R^{\mathcal{Q}}(\tau) = e_R^{\int_0^\tau ds \mathcal{Q}^0 iL(\Gamma_0, s+t-\tau)} (=U_R^{\mathcal{Q}}(\Gamma_0, \tau, t)) \quad (26)$$

(referred to as a “strange” propagator [15]) where the last equality highlights the dependence of the $U_R^{\mathcal{Q}}$ on the initial irrelevant coordinates a_0 and on an explicit time t .