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Fourth-order master equation for a charged harmonic oscillator coupled to an electromagnetic field ARZU KURT[1], RESUL ERYIGIT[2], Abant Izzet Baysal University — Using Krylov averaging method, we have derived a fourth-order master equation for a charged harmonic oscillator weakly coupled to an electromagnetic field. Interaction is assumed to be of velocity coupling type which also takes into account the diagmagnetic term. Exact analytical expressions have been obtained for the second, the third and the fourth-order corrections to the diffusion and the drift terms of the master equation. We examined the validity range of the second order master equation in terms of the coupling constant and the bath cutoff frequency and found that for the most values of those parameters, the contribution from the third and the fourth order terms have opposite signs and cancel each other. Inclusion of the third and the fourth-order terms is found to not change the structure of the master equation.

[1]Bolu, Turkey
[2]Bolu, Turkey

Arzu Kurt
Abant Izzet Baysal University

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