Splitting time dependence in Lindblad master equation\textsuperscript{1} GEHAD SADIEK, Physics Department, King Saud University, Riyadh 11451, Saudi Arabia, E.I. LASHIN, Physics Department, Ain Shams University, Cairo 11451 and Center for Theoretical Physics, Zewail City for science and Technology, Giza 12588, Egypt — We consider the Markovian master equation in the Lindblad form. We assume an ansatz for the solution of the equation in the form of a time-dependent density matrix of the same form as the solution of the Hamiltonian but with time-dependent coefficients. We show that applying this ansatz one can find the solution of the master equation by solving a system of coupled differential equations of the coefficients utilizing the known time-evolved wave function driven by the Hamiltonian only. This approach splits the time dependence problem in the master equation into two parts, one carried by the wave function of the Hamiltonian and the other by the coefficients of the density matrix, which significantly simplifies the evaluation process. As an example we apply this approach to the problem of a system of qubits coupled to a Lindblad environment and demonstrate how powerful it is treating the problem.

\textsuperscript{1}We are grateful to the Saudi NPST (project no.11-MAT1492-02 ) and the deanship of scientific research in King Saud University for support.