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Born approximation in linear-time invariant system

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Linear-time invariant (LTI) oscillation systems such as mechanical vibration,
series RLC and parallel RLC circuits under external driving force can be solved by using simplest initial conditions or
employing of Green's function of which knowledge of initial condition
of the driving force term is needed. Here we show a mathematical connection of the LTI system and the Helmholtz equation.
Time-independent Schr\"{o}dinger equation in quantum mechanical scattering problem, as in undergraduate physics course, can be written in form of the Helmholtz equation.
We apply Born approximation used in quantum mechanics
to obtain LTI general solution in form of infinite Born series which can be expressed as a series of one-dimensional Feynman graphs.
Conditions corresponding to the Born approximation and slow-roll approximation are given for the case of harmonic driving force.
We show that by transforming the second-order LTI system into Helmholtz equation, the Born-approximated general solution can be found
(at least to first order approximation) for any form of driving force, given the driving force initial value.

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