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# Dynamics of Accelerated Waves

This work aims to study higher-order field equations. To achieve this, starting from the equations of motion of coupled one-dimensional oscillators, we derive a set of fourth-order equations using the method of order-elevation decoupling. In the continuous limit, we identify a fourth-order field equation that generalizes the classical wave equation. This equation can describe waves with propagation acceleration, such as those propagating through heterogeneous mediums or crossing interfaces between different materials. We obtain a solution to this field equation using specific conditions. We conclude that, for high accelerations and low-frequency vibrational modes, the description can be approximated by a classical wave, but for high frequencies, an exact solution is necessary. This study is ongoing with an approach via singular perturbation theory.

**Primary author:** FRANCISCO DE SOUZA, Ivan

**Co-author:** ANDERSON MIQUELE DE MELO, Cássius

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