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Nonlinear Effects in Gravitational Radiation using Various Approximations THOMAS LARNED, VIVEK NARAYANAN[1], Rochester Inst of Tech — Solutions to the Einstein field equations (EFE) are seldom discovered due to its nonlinear attributes. To circumvent this dilemma, physicists employ perturbation theory to approximate the EFE, which to the first-order neglect all nonlinear contributions due to the perturbation. The linearized EFE to the first-order are appropriate in weak gravitational fields, within the Newtonian limit, but are often paradoxical and lack self-consistency. With recent experimental observations of gravitational waves as our motivation, we are exploring the effect of these nonlinear terms in wave solutions of the perturbation for simple models, such as compact binaries. The higher order terms that are neglected by the linearization process may yield significant results that can be observed and utilized in emerging gravitational-wave astronomy.

[1]Faculty Advisor

Thomas Larned
Rochester Inst of Tech

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