

Abstract Submitted
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Stochastic Optimization Techniques on Parameter Estimation of Binary Inspirals: Particle Swarm Optimization and Genetic Algorithm¹

SHIHAN WEERATHUNGA, Center for Gravitational Wave Astronomy, University of Texas at Brownsville; Department of Physics, University of Texas at San Antonio, SOUMYA MOHANTY², Center for Gravitational Wave Astronomy, University of Texas at Brownsville — The search for gravitational wave (GW) signals from inspiraling compact object binaries is performed using matched filtering on GW detector data. Numerical maximization is applied over a set of matched filter outputs to estimate signal parameters. The noisy nature of the data and the large number of signal parameters lead to a highly multi-modal and high dimensional objective function. This precludes the use of deterministic locally convergent optimization algorithms and a plain grid search is computationally prohibitive for even a modest number of signal parameters. Stochastic optimization methods can be used to efficiently find optimal solutions in such situations. We are engaged in a comprehensive study of the performance of two popular stochastic optimization algorithms, Particle Swarm Optimization and Genetic Algorithm, on the GW matched filtering problem. Results are presented here for a two dimensional testbed binary inspiral problem. Studies of higher dimensional problems are in progress.

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