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Abstract: Researchers using ordinary differential equations to model phenomena face two main challenges among others: implementing the appropriate model and optimizing the parameters of the selected model. The latter often proves difficult or computationally expensive. Here, we implement Particle Swarm Optimization, which draws inspiration from the optimizing behavior of insect swarms in nature, as it is a simple and efficient method for fitting models to data. We demonstrate its efficacy by showing that it outstrips evolutionary computing methods previously used to analyze an epidemic model.