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Title: Persistence-time and calibration for Stochastic Differential Models

Abstract: Population extinction is one of the central themes in population biology, because the mean extinction-time depends on the initial population size and satisfies the backward Kolmogorov differential equation, in the paper: F. de la Hoz and F. Vadillo **A mean extinction-time estimate for a stochastic Lotka-Volterra predator-prey model**, Applied Mathematics and Computation, (2012), 219, 170-179, we prove the nonnegative character of its solutions for the corresponding backward Kolmogorov differential equation and we make a direct comparison between predictions and numerical simulations of stochastic differential equations (SDEs).

In our second stage in the paper: F. Vadillo: **Comparing stochastic Lotka-Volterra predator-prey models**, Applied Mathematical and Computation (2019), 360, 181-189, we study the above problem for three different stochastic models built from a single Lotka-Volterra deterministic model. Our analysis and numerical results allow us to conclude that there are important differences between the three models. These differences enable us to choose the most "natural way" to turn the deterministic model into a stochastic model.

Finally, in our most recent result in the paper: A. Moujahid and F. Vadillo: **Modeling and Calibration for Some Stochastic Differential Models**, Fractal and Fractional (2022), 6, 707, we use the data from the stochastic models to estimate the model parameters by solving a nonlinear regression problem. Since the stochastic solutions are not differentiable, we use the well-known Nelder-Mead algorithm. Our numerical results show that the fitting procedure is able to obtain good estimates of the parameters requiring only a few sample data.