Sweilam, Nasser H.; Al-Mekhlafi, Seham M.
Nonstandard theta Milstein method for solving stochastic multi-strain tuberculosis model. (English) Zbl 1437.92140 J. Egypt. Math. Soc. 28, Paper No. 12, 16 p. (2020).

Summary: In this article, a novel stochastic multi-strain tuberculosis model is presented. Numerical simulations for this model are the main aim of this work. A non-standard theta Milstein method is constructed to study the proposed model, where the proposed method is based on choosing the weight factor theta. The main advantage of this method is it can be explicit or implicit with large stability regions using the idea of the weighed step introduced by R. E. Mickens [Nonstandard finite difference models of differential equations. Singapore: World Scientific (1994; Zbl 0810.65083)]. Mean-square stability of nonstandard theta Milstein method is studied. The new scheme shows a greater behavior compared to the theta Milstein method. It is concluded that the proposed scheme preserves the positivity of the solution and numerical stability in larger region than the standard method.

MSC:
92D30 Epidemiology
60H10 Stochastic ordinary differential equations (aspects of stochastic analysis)

Keywords:
non-standard theta Milstein method; multi-strain tuberculosis; mean square stability analysis

Software:
Matlab

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