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# A NONLINEAR POPULATION DYNAMICS EQUATION WITH STOCHASTIC DEMOGRAPHIC RATES

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We are concerned with a nonlinear nonautonomous model represented by an equation describing the dynamics of an age-structured population diffusing in a space habitat, governed by nonlinear vital factors and by a stochastic term standing for demographic rates, possibly including emigration, immigration, and fortuitous mortality. The stochastic influence is expressed by a linear multiplicative noise perturbation in the equation. The main result is that for certain initial random conditions, the solution to the stochastic model is well posed in the class of path-wise continuous functions and satisfies, in addition, particular regularities with respect to the age and space. The approach is based on a rescaling transformation of the stochastic equation into a random deterministic equation. The well-posedness of the random equation is proved by combined semigroup, variational and passing to the limit techniques. The information given by this result is transported back via the rescaling transformation in order to prove the existence and uniqueness in the stochastic population dynamics equation.