Two population dynamics models with child care

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We will present two age-structured population dynamics models taking into account child care. One of the models includes a harmonic mean type mating of sexes and parental care of offspring and is a generalization of the Hoppensteadt-Staroverov-Hadeler model [1] and a model in [2]. In this model each sex has pre-reproductive and reproductive age grades. All adult individuals (of reproductive age) are divided into single males, single females, and permanent pairs. All pairs are of two types: pairs without offspring under parental care at the given time and pairs taking parental care of their offspring. Only pairs may produce offspring in this model. All individuals of pre-reproductive age are divided into young (under parental care) and juvenile groups. The model consists of six integro-PDE subject to conditions of an integral type. The separable solutions are examined for this model and a system for macro-moments evolving in time is obtained. Some numerical results will be discussed.

The other model describes the dynamics of an asexual age-structured population with child care. The population consists of the young (under maternal care), juvenile, and adult classes. Death moduli of the juvenile and adult classes are decomposed into the sum of two terms. The first presents the death rate by the natural causes while the other describes an environmental influence depending on the total population. An existence and uniqueness theorem is proved for the general initial distributions, a class of the separable solutions is constructed, and the large time behavior of the general solution is given. In the other case of this model the spatial diffusion is included. The steady-state and the separable solutions are examined and the large time behavior of separable solutions is studied.

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References

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