A Study of Hamilton-Jacobi-Bellman Equation Systems Arising in Differential Game Models of Changing Society

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Abstract : This paper is concerned with a system of Hamilton-Jacobi-Bellman equations coupled with an autonomous dynamical system. The mathematical system arises in the differential game formulation of political economy models as an infinite-horizon continuous-time differential game with discounted instantaneous payoff rates and continuously and discretely varying state variables. The existence of a weak solution of the PDE system is proven and a computational scheme of approximate solution is developed for a class of such systems. A model of democratization is mathematically analyzed as an illustration of application.