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Abstract
Because the techniques of the biochemical waste treatment are very important, the techniques of the cultivation of the microorganism have received more attention in recent years. A study is conducted to analyze the steady states and dynamic bechavior of the reactions of the cell-substrate and the prey-predator interaction in two chemostats in series. For the reaction of cell-substrate in two chemostats in series, if the specific growth rate of the Monod model is used for the cell , there are three types of steady states for this reaction system. These three types of steady states and stability are analyzed in detail. The dynamic behavior of this reaction system is analyzed by the numerical method and computer graphs. The results show that the dynamic behavior of this system consists of stable steady states.
For the prey-predator interaction, the dynamic equations are derived by assuming that the reaction is occurring in a perfectly mixed condition. It is assumed that the prey(such as the bacterium) is only fed with the substrate(such as the glucose) and the predator(such as the ciliate) is only fed with the prey and no other substance exchanges between the system and the environment. If the Monod model is used for the specific growth rate of both the prey and the predator, there are six types of steady states for this reaction system and the six types of steady states and stability are analyzed in detail. The dynamic equations of this system are solved by the numerical method and the dynamic analysis is performed by computer graphs. The results show that the dynamic behavior of this system consists of stable steady states and limit cycles.
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