COMPARISON OF THREE PROPOSED CONTROLS TO ACCELERATE THE GROWTH OF THE CROP

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Abstract. *Through the time, there are less farms and less production of food, however, more food is required. The people are afraid for the high costs of the food, and some kinds of food cannot be bought by some persons. In some countries as India and China, the population has grown increasing their necessity of food. Other situation is that some land has been taken for other things subtracting the space used for the agriculture. In this paper, three kinds of controls are proposed to accelerate the growth of the crop plants, yielding an increase in the crop production in a greenhouse. The major contributions of this paper are as follows: 1) The singular perturbed control is modified to be applied to accelerate the greenhouse crop production and to be exponential stable, however, the condition that needed to guarantee the exponential stability of the tracking error of the closed loop system in the theory is not satisfied and in the simulations, it is shown that this control does not have a good behavior. 2) The state feedback control is modified to be applied to accelerate the greenhouse crop production and to be exponential stable, however, in the last row of a matrix related with the control has zeros giving that even the exponential stability of the tracking error of the closed loop system is assured in the theory, the simulations give that the state which describes the growth of the crop cannot be controlled. 3) The fictitious control is modified to be applied to accelerate the greenhouse crop production and to be exponential stable, the exponential stability of the tracking error of the closed loop system is a assured in the theory, and in the simulations it is shown that this control has a good tracking control behavior.*
Keywords: Greenhouse, Singular perturbed control, State feedback control, Fictitious control, Exponential stability

1. **Introduction.** Through the time, there are less farms and less production of food, however, more food than before is required. The people are afraid for the high costs of the food, and some kinds of food cannot be bought by some persons. In some countries as India and China, the population has grown increasing the necessity of food. Other situation is that some land has been taken for other things subtracting the space used for the agriculture.

In the world, the necessity has been presented to make researching in the agriculture to develop highly efficient systems for the production of food.

One of this systems is a greenhouse where there are some kinds of plants of food that grow with controlled conditions.