Impulsive Stabilization and Application to a Population Growth Model*

Xinzhi Liu[1] and Xuemin Shen[2]

[1]*Department of Applied Mathematics, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1.*

[2]*Department of Electrical and Computer Engineering, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1.*

Abstract: This paper studies the problem of impulsive stabilization of a system of autonomous ordinary differential equations. Necessary and sufficient conditions are established for a given state, which need not be an equilibrium point of the system, to be impulsively stabilizable. These results are applied to a three-species population growth model. In the population growth model, it is shown that by impulsively regulating one species, the population of all three species can be maintained at a positive level, which otherwise would drop to a level of extinction for one of the species.

Keywords: *Impulsive stabilization; control; population growth model.*

Mathematics Subject Classification (2000): 34A37, 34d20, 93B05, 93C15.