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# INDUCTION CONTROL OF A THREE-SPECIES FOOD CHAIN SYSTEM*

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**Abstract.** First, the relation between induction control domain and ultimately bounded domain which makes the system permanent is given. Second, the induction control of a three-species food chain system is discussed and the control law with which the closed-loop system can be permanent is obtained.

**Keywords.** Induction control, Induction control domain, State feedback, Permanent, Food chain system.

## 1 Introduction

Many researchers have been studying the control problem of biosystems for a long time. First in [1] several optimal models were proposed for biosystems, the author of [2] studied some optimal control problems on ecosystems through optimal control techniques, and [3] applied optimal control techniques to the optimal management of renewable resources, respectively, while others studied the optimal harvesting or inputting of populations in biosystems in [9]. In general, the controls above are non-zero continuous functions, thus the state of the systems is adjusted accordingly. But these controls may lead to the waste of manpower and material resources. Impulse control can avoid these problems, so some researchers applied impulse control to the growth models of populations [10, 11, 12, 13, 14]. It is well-known that impulse control may cause the perturbation of systems under consideration. In order to avoid these perturbations, some attention was paid to induction control in [15], and authors of [16] applied induction control to a two–species competitive system and investigated its permanence with induction control, but they did not apply this method to higher–dimensional population systems. In this paper, we will apply induction control to a three–dimensional food chain system.

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