

# Turnpike Theorem for Convex Infinite Dimensional Discrete-Time Control Systems

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**Abstract:** In this work we study the structure of "approximate" solutions for an infinite dimensional discrete-time optimal control problem determined by a convex function  $v: K \times K \rightarrow \mathbb{R}^1$ , where  $K$  is a convex closed bounded subset of a Banach space. We show that for a generic function  $v$  there exists  $y_v \in K$  such that each "approximate" optimal solution  $\{x_i\}_{i=0}^n \subset K$  is contained in a small neighborhood of  $y_v$  for all  $i \in \{N, \dots, n-N\}$ , where  $N$  is a constant which depends on the neighborhood and does not depend on  $n$ .

**Keywords:** Turnpike property, Banach space, convex function, generic function

**Classification (MSC2000):** 49J99

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