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The turnpike property in optimal control – Recent progress and stochastic extensions

The turnpike phenomenon is known to be of major importance in optimal control approaches to economic problems, see McKenzie (1976). While the term turnpike has been introduced by Dorfman, Samuelson and Solow in 1958, early observations are due to Ramsey (1928) and von Neumann (1938). A recent line of research uses dissipativity notions for control systems to analyze turnpike problems. We begin by recalling the notion of turnpike properties of optimal control problems.

We then show how dissipativity helps to analyze optimal control problems on with respect to turnpike properties. and on the infinite horizon. That is we present a dissipativity based answer to Halkin's problem. Moreover, we show how dissipativity-based turnpike analysis can be extended to stochastic problems. Finally, we comment on how receding-horizon strategies allow to approximate infinite-horizon optimal solutions.