Applications of control theory to dynamical systems with different timescales

Jorge A. Jover Galtier[1],

SUMMARY

Control theory is one of the fields of mathematics with a broader range of applications. Control systems are governed by sets of differential equations where some time-dependent functions, called the controls, are to be suitably chosen to reach a desired state. Controls represent the external action of the environment or an operator on a dynamical system, and thus appear in many different fields of applied sciences, such as physics, chemistry, quantum information and many others.

In this talk, I will briefly present the fundamental aspects of control theory and how it is related to the usual study of dynamical systems. In particular, I will focus on systems characterized by largely different timescales, commonly known as fast-slow dynamics. These systems can be properly described by tools such as geometric singular perturbation theory, and I will discuss how this description can be adapted to deal with control problems.

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[1]Departamento de Matemtica Aplicada
 Universidad de Zaragoza
 email: `jorgejover@unizar.es`