PRESENTATION OF POSTDOCTORAL RESEARCH

On Monday 21st of February 2022 at 18:00

the postdoctoral researcher of the School of Physics

Lazaros Moysis

will give a public talk on the results of his postdoctoral research, on:

"Observer Design for Descriptor Systems with Applications to Synchronization and Secure Communications Using Chaotic Systems"

Supervisor: Christos Volos, Associate Professor

The event will be held virtually over the ZOOM platform, using the following link:
https://authgr.zoom.us/j/93342599968?pwd=a09qckgveXVEVUVyQU9WUG1KSDhtZz09

Meeting ID: 933 4259 9968

Passcode: 812352

In the present postdoctoral research, the problem of observer design for descriptor systems was studied. Descriptor systems, which are often encountered in the modeling of physical systems, are described by a combination of differential and algebraic equations and constitute a generalization of regular systems. The observer design is a fundamental problem in systems' control theory and refers to the estimation of the internal states of a system, which cannot be directly measured through the output. The accurate estimation of the internal states ensures full knowledge of the system, and thus the observer can be used for control problems.

In the present study, various novel aspects of the observer design problem were considered. Specifically, the presence of nonlinear terms in the output was studied, which can appear in applications, and pose an advanced design problem. Additionally, different types of nonlinear functions where considered, to study how they affect the observer design. Also, systems that showcase unique phenomena were studied and used, like systems with hidden, or coexisting attractors.

The observer design results were then applied to the problem of chaos synchronization and secure communications. In this application, an information signal, for example an image, can be safely masked and transmitted through a master system, and then successfully reconstructed at the receiver end, which is the observer system.

A simplified diagram for the observer design.