

Exponential Stability of Second Order Delay Differential Equations through Floquet Theory with Application to Angular Stabilization of Drone Flight

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Abstract

In this talk, we obtain results on exponential stability of second order delay differential equations, which are based on a version of the Floquet theory for delay differential equations of the second order we proposed. Our version allows researchers to preserve the order of equation and to obtain analogues of the classical results of the Floquet theory known for ordinary differential equations. On the basis of our version of the Floquet theory, new original unexpected results on the exponential stability are proposed.

Our results do not assume smallness of the product of delay and gain. We demonstrate that choosing period of coefficients and delays of the gain in corresponding intervals allows to achieve the exponential stabilization in the cases considered as impossible when the standard technique was applied. Then we use obtained stability tests in a model of angular stabilization of drone's flight.

Results of the talk were obtained in joint paper with O.Kupervasser, S.Malev and T.Shavit.

Key Words and Phrases: Delay Equations, Floquet theory, Exponential stability without assumption on smallness the product of gain and delay