

## ABSTRACT

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Extremum seeking control aims at determining and keeping the output of a non-linear map on its unknown extremum point. In the literature, despite of considering an unknown objective function in the real-time optimization problem, it is mandatory to know whether the extremum point is a maximum or a minimum, which is determined by means of the Hessian signs in case of static and dynamic scalar maps. This paper proposes the process of extremum seeking occurs independent of the Hessian sign information. The key idea is to combine the classical extremum seeking approach with a switching monitoring function. The switching algorithm will drive the closed-loop system to the unknown extremum, neglecting if it is a maximum or a minimum. In addition, simulation results show the robustness properties of the proposed recipe under changes of the Hessian signs occurring “on-the-fly” fashion as well as its adaptability to solve distinct online minimizing and maximizing problems in sequence.

Keywords: Extremum-seeking Control, Adaptive Control, Uncertain Nonlinear Systems, Switching Monitoring Function, Real-time Optimization.