BOUNDARY STABILIZATION OF THE KORTEWEG-DE VRIES-BURGERS EQUATION WITH AN INFINITE MEMORY-TYPE CONTROL AND APPLICATIONS: A QUALITATIVE AND NUMERICAL ANALYSIS

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ABSTRACT. This work is intended to present a qualitative and numerical analysis of well-posedness and boundary stabilization problems of the well-known Korteweg-de Vries-Burgers equation. Assuming that the boundary control is of memory type, the history approach is adopted in order to deal with the memory term. Under sufficient conditions on the physical parameters of the system and the memory kernel of the control, the system is shown to be well-posed by combining the semigroups approach of linear operators and the fixed point theory. Then, energy decay estimates are provided by applying the multiplier method. An application to the Kuramoto-Sivashinsky equation will be also given. Moreover, we present a numerical analysis based on a finite differences method and provide numerical examples illustrating our theoretical results.

Keywords: Korteweg-de Vries-Burgers equation, Kuramoto-Sivashinsky equation, boundary infinite memory, well-posedness, stability, numerical analysis, semigroups approach, fixed point theory, energy method, finite differences method.

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