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Output regulation problem for a class of regular hyperbolic systems. (English) Zbl 1332.93155

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Summary: This paper investigates the output regulation problem for a class of regular first-order hyperbolic partial differential equation (PDE) systems. A state feedback and an error feedback regulator are considered to force the output of the hyperbolic PDE plant to track a periodic reference trajectory generated by a neutrally stable exosystem. A new explanation is given to extend the results in the literature to solve the regulation problem associated with the first-order hyperbolic PDE systems. Moreover, in order to provide the closed-loop stability condition for the solvability of the regulator problems, the design of stabilising feedback gain and its dual problem design of stabilising output injection gain are considered in this paper. This paper develops an easy method to obtain an adjustable stabilising feedback gain and stabilising output injection gain with the aid of the operator Riccati equation.

MSC:

93C20 Control/observation systems governed by partial differential equations
35L02 First-order hyperbolic equations
93B52 Feedback control

Keywords:

regular hyperbolic PDE system; state feedback regulator; stabilising feedback gain; error feedback regulator; stabilising output injection gain; Sylvester equation; Riccati equation

Full Text: DOI

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