

STABILITY AND STABILIZATION FOR A SYSTEM OF LINEARIZED CONSERVATION LAWS.

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Abstract

In combined heat electricity generation (co-generation) the long distance steam pipe connecting the generator (steam turbine) and the heat consumer is described by a system of conservation laws. Another nonlinear physical law taken into account in the mathematical description here is the Saint Venant undercritical/critical flow law. The considered system composed of the linearized conservation laws, the linearized Saint Venant formulae and the bilinear turbine model is described by a hyperbolic system of partial differential equations with non-standard boundary conditions, where the control signals are “injected”. A system of neutral functional differential equations is associated by integration along the characteristics and a stabilization structure is designed using a suitable control Lyapunov function. Then asymptotic stability is discussed using either the same control Lyapunov function and a singular perturbation argument or a modified version of the aforementioned Lyapunov function.