Perturbation Analysis of hyperbolic PDAEs

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We consider hyperbolic partial differential-algebraic equations describing flow transport networks. First we discuss the modeling of water and gas transport networks. We show that such network can be described by a combination of hyperbolic partial differential equations for each pipe and linear constrained equations for junctions. We analyze the PDAE system as an operator DAE and derive perturbation estimations for the perturbed PDAE systems including perturbations of the equations, of the initial values as well as of the boundary values.