# On the Convergence Property for Differential Algebraic Equations Modeling Transient Hydraulic Circuits

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**Abstract:** Consider the differential algebraic equation

$$\Lambda_1(x) := A\dot{x} + F(x,t,\nu) = 0,\ t \in I_t = (-\infty, +\infty), \tag{1}$$

where $A$ is a constant $(n \times n)$-matrix, $F(x,t,\nu)$ is an $n$-dimensional vector-function, $x \equiv x(t)$ is a desired vector-function, $\nu \in \mathcal{N} = (-\nu_0, \nu_0)$ is a scalar parameter. It is assumed that

$$\det A = 0.$$

Let system (1) have a solution $\eta(t,\nu),\ t \in I_t$, and herewith all other solutions $x(t,\nu;t_0,x_0)$ of system (1) satisify the following condition

$$\lim_{t\to\infty}[x(t,\nu;t_0,x_0) - \eta(t,\nu)] = 0,\ x_0 = x(t_0,\nu).$$

Then we say that system (1) possesses the convergence property, and the solution $\eta(t,\nu)$ possesses the contraction property.

In this talk we discuss convergence and contraction properties of differential algebraic equations of the form (1) modeling transient hydraulic circuits.

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