

**Conditions of global solvability, Lyapunov stability,
Lagrange stability and dissipativity for time-varying
semilinear differential-algebraic equations, and
applications**

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Theorems on the existence and uniqueness of global solutions, Lagrange stability and instability, dissipativity (ultimate boundedness), Lyapunov stability and instability, and asymptotic stability for time-varying semilinear DAEs (nonautonomous degenerate ordinary differential equations) will be presented, and mathematical models of nonlinear time-varying electrical circuits will be considered in order to demonstrate the application of the presented theorems. The features and advantages of the obtained theorems will also be discussed. The talk is based on the results published in the journals “Differential Equations”, “Global and Stochastic Analysis”, and “Proceedings of the Institute of Mathematics and Mechanics”.