$$z'(t) \cap f(t, z(t)) \neq \emptyset,$$

where z is a linear operator on a complex Hilbert space. If Ω is the Siegel disk $z^*z < 1$, the tangent condition is often needed only on the Šilov boundary; this remark greatly increases the scope of the results. The special case

$$a(t) + b(t)z(t) + z(t)d(t) + z(t)c(t)z(t) \in z'(t)$$

applies to equations of multiple transmission lines and transport processes, and also yields results on pure operator equations (no derivatives). For example, if $b \neq 0$ and $d \neq 0$, then one of the functions

$$f(z) = a + bz(1 - cz)^{-1}d, \quad g(z) = c + dz(1 - az)^{-1}b$$

maps the Siegel disk into itself if, and only if, the other one does. Further study of operator differential equations gives results on oscillatory properties of $(pz')' + qz = 0$ which parallel those in the classical case. Extension to higher-order equations involves a far-reaching generalization of the notion of "adjoint" where, instead of an adjoint operator, one has an adjoint subspace. Among contributors to these developments are Ambartzumian, Preisendorfer, Reid, Bellman, Kalaba, Wing, Ueno, Chandrasekhar, A. Wang, Zakhar-Itkin, J. Levin, Paszkowski, Shumitzky, Helton, Krein and Shmul'yan, Etgen and Lewis, and Coddington and Dijksma.

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BULLETIN OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 84, Number 4, July 1978

Nonlinear semigroups and differential equations in Banach spaces, by Viorel Barbu, Noordhoff International Publishing, Leyden, The Netherlands, 1976, 352 pp.

The typical first graduate course in ordinary differential equations begins with a discussion of the initial-value or Cauchy problem. Under a variety of assumptions, it is shown that this problem has a solution, that it is unique, and that it depends nicely on the data. Thus, under mild restrictions, Cauchy problems in classical ordinary differential equations are well posed. As the course progresses and more special topics are pursued, these preliminary results begin to seem rather simple and, in a short time, are taken for granted by the serious student. Nevertheless, one is always thinking in terms of them. Scientists and engineers often think the same way: a system being modeled has a state u which changes in time according to a differential (or evolution) equation

$$\text{(EE)} \qquad du/dt = A(u)$$

which summarizes the dynamics of the system. In classical mechanics and many other fields the state is a list of numbers (giving, e.g., velocities and positions of bodies or populations of species or quantities of reactants, etc.,) and (EE) is a classical ordinary differential equation, where "classical ordinary differential equation" means roughly that A continuously maps an open subset of some $\mathbf{R}^N$ into $\mathbf{R}^N$. One specifies an initial condition

$$\text{(IC)} \qquad u(0) = u_0$$