

Editorial

Qualitative Theory of Functional Differential and Integral Equations 2016

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The study of qualitative theory of various kinds of differential equations began with the birth of calculus, which dates to the 1660s. Part of Newton's motivation in developing calculus was to solve problems that could be attacked with differential equations. Now, with over 300 years of history, the subject of qualitative theory of differential equations, integral equations, and so on represents a huge body of knowledge including many subfields and a vast array of applications in many disciplines. It is beyond exposition as a whole. Qualitative theory refers to the study of the behavior of solutions without determining explicit formulas for the solutions. In addition, it should be noted that if solutions of an equation describing a dynamical system or of any kind of differential equations under consideration are known in closed form, one can determine the qualitative properties of the system or the solutions of that equations, by applying directly the definitions of relative mathematical concepts. As is also well-known, in general, it is not possible to find the solution of all linear and nonlinear differential equations, except numerically. Moreover, finding of solutions becomes very difficult for functional differential equations, integral equations, partially differential equations, and fractional differential equations rather than for ordinary differential equations. Thus, indirect methods are needed. Therefore, it is very important to obtain information on the qualitative

behavior of solutions of differential equations when there is no analytical expression for the solutions. So far, in the relevant literature, some methods have been improved to obtain information about qualitative behaviors of solutions of differential equations without solving them. Here, we would not like to give the details of methods.

It is worth mentioning that, in the last century, theory of ordinary differential equations, functional differential equations, partially differential equations, integral equations, and integrodifferential equations has developed quickly and played many important roles in qualitative theory and applications of that equations. Some problems of considerable interest in qualitative theory of ordinary differential equations, functional differential and integral equations, integrodifferential equations, fractional differential equations, partially differential equations, and so forth include many topics such as stability and instability of solutions, boundedness of solutions, convergence of solutions, existence of periodic solutions, almost periodic solutions, pseudo almost period solutions, existence and uniqueness of solutions, global existence of solutions, global stability, bifurcation analysis, control of chaos, boundary value problems, oscillation and nonoscillation of solutions, and global existence of solutions. Functional differential equations, which include ordinary and delay differential equations, partially differential equations,