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Editorial

Nonlinear Elliptic Systems and Nonlinear Parabolic Systems

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Nonlinear elliptic and parabolic differential equations play important roles in applied mathematics since they can describe many phenomena arising in mathematical physics, engineering fields, electricity, fluid dynamics, and many other fields, such as the filtration theory, phase inversion theory, biochemistry, the dynamics of biology, and non-Newtonian theory. Hence, it is important to develop novel theories and methods to investigate nonlinear elliptic or parabolic systems or related topics. The papers selected for this special issue represent a good panel for addressing this challenge. Of course, the selected topic and the papers are not an exhaustive representation of the area of nonlinear elliptic systems and nonlinear parabolic systems. Nonetheless, they represent the rich and many-facet knowledge, which we have the pleasure of sharing with the readers.

The special issue contains nine papers, where two papers are related to A-harmonic equation. One paper introduces a new method of 3D facial expression animation. One paper is regarding the Li-Yorke sensitivity of set-valued discrete systems and one paper is considering inverse estimates for nonhomogeneous backward heat problem. Finally, four papers cover the iterative algorithms for split feasibility problem, equilibrium problem, variational inequalities, and so forth.

In a paper entitled "*Higher integrability for very weak solutions of inhomogeneous A-harmonic form equations,*" Y. Tong et al. study an A-harmonic form equation with more general growth conditions than the usual ones. The higher integrability for very weak solutions is proved.

In a paper entitled "*Inverse estimates for nonhomogeneous backward heat problems,*" T. Min et al. investigate the inverse problem in the nonhomogeneous heat equation involving the recovery of the initial temperature from measurements of the final temperature. This problem is known as the backward heat problem and is severely ill-posed. They show that this problem can be converted into the first Fredholm integral equation and an algorithm of inversion is given using Tikhonov's regularization method. The genetic algorithm for obtaining the regularization parameter is presented. They also present numerical computations that verify the accuracy of their approximation.

In the paper entitled "*New mixed equilibrium problems and iterative algorithms for fixed point problems in Banach spaces,*" M. Chen et al. first introduce a new mixed equilibrium problem with a relaxed monotone mapping in Banach spaces and then prove the existence of solutions of the equilibrium problem. Later, they introduce a new iterative algorithm for finding a common element of the set of solutions of the equilibrium problem and the set of fixed points of a quasi-φ-nonexpansive mapping and prove some strong convergence theorems of the iteration.

In the paper entitled "*Li-Yorke sensitivity of set-valued discrete systems,*" H. Liu et al. consider a surjective, continuous map $f : X \to X$ and a continuous map $\overline{f}$ of $\kappa(X)$ into itself introduced by f, where X is a compact metric space and $\kappa(X)$ is the space of all nonempty compact subsets of X endowed with the Hausdorff metric. They give a short proof of the fact that if $\overline{f}$ is Li-Yorke sensitive, then f is Li-Yorke sensitive. They also give an example showing that the inverse is not always true; that is, if f is Li-Yorke sensitive, then $\overline{f}$ may not be.