

Colloquium

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Fixed Point Theory of Monotone Mappings with a Graph Approach

Nonexpansive mappings are those maps that have Lipschitz constant equal to one. The fixed-point theory for such mappings is rich and varied. It finds many applications in nonlinear functional analysis. The existence of fixed points for nonexpansive mappings in Banach and metric spaces have been investigated since the early 1960s. Recently a new direction has been discovered dealing with the extension of the Banach Contraction Principle to metric spaces endowed with a partial order. The first attempt was successfully carried by Ran and Reurings. In particular, they showed how this extension is useful when dealing with some special matrix equations. Another similar approach was carried by Nieto et al. and used such arguments in solving some differential equations. Jachymski gave a more general unified version of these extensions by considering graphs instead of a partial order. In this talk, we will discuss the case of monotone nonexpansive mappings endowed with a graph. Some of the results obtained are new and open the door to some new directions in metric fixed-point theory.