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Research Article

Monotone Generalized Nonlinear Contractions in Partially Ordered Metric Spaces

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A concept of g-monotone mapping is introduced, and some fixed and common fixed point theorems for g-non-decreasing generalized nonlinear contractions in partially ordered complete metric spaces are proved. Presented theorems are generalizations of very recent fixed point theorems due to Agarwal et al. (2008).

1. Introduction

The Banach fixed point theorem for contraction mappings has been extended in many directions (cf. [1–28]). Very recently Agarwal et al. [1] presented some new results for generalized nonlinear contractions in partially ordered metric spaces. The main idea in [1, 20, 26] involve combining the ideas of iterative technique in the contraction mapping principle with those in the monotone technique.

Recall that if $(X, \leq)$ is a partially ordered set and $F : X \to X$ is such that for $x, y \in X$, $x \leq y$ implies $F(x) \leq F(y)$, then a mapping F is said to be non-decreasing. The main result of Agarwal et al. in [1] is the following fixed point theorem.

Theorem 1.1 (see [1, Theorem 2.2]). *Let $(X, \leq)$ be a partially ordered set and suppose there is a metric d on X such that (X, d) is a complete metric space. Assume there is a non-decreasing function $\psi : [0, +\infty) \to [0, +\infty)$ with $\lim_{n\to\infty}\psi^n(t) = 0$ for each $t > 0$ and also suppose F is a non-decreasing*