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ON GENERALIZED COMPLETE METRIC SPACES

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The following remarks are of interest in connection with the research announcement [1]:

LEMMA. *A generalized metric space is the disjoint union of metric spaces such that each metric space is infinitely distant from every other metric space.*

PROOF. Note that $d(x, y) < \infty$ is an equivalence relation, and the equivalence classes obtained are metric spaces. Also, if the generalized space is complete, so is each metric space. Q.E.D.

Let $M = \bigvee_{\alpha \in A} M_\alpha$ denote the above partitioning. The Banach contraction principle becomes

PROPOSITION 1. *Let T be a strict contraction of a generalized complete metric space $M = \bigvee_{\alpha \in A} M_\alpha$, $0 \leqq q < 1$, $d(x, y) < \infty \Rightarrow d(Tx, Ty) \leqq qd(x, y)$. For each $\alpha \in A$, $\exists \beta \in A$ such that $T(M_\alpha) \subseteq M_\beta$. There is a unique periodic point of order n in each M_α such that $T^n(M_\alpha) \subseteq M_\alpha$.*

PROOF. Let $x, y \in M_\alpha$, $Tx \in M_\beta$. Then $d(x, y) < \infty \Rightarrow d(Tx, Ty) < \infty \Rightarrow Ty \in M_\beta$. Since T^n is a strict contraction of the complete metric space M_α, it has a unique fixed point, which is a periodic point of order n for T. Q.E.D.

The local contraction principle becomes