

## Kannan contractions and strongly demicontractive mappings

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### ABSTRACT.

Inclusion relations between strongly demicontractive mappings, quasi  $(L, m)$ -contractions, and Kannan contractions are established. As corollaries,  $T$ -stability and strong convergence of Picard and Mann iterations for strongly demicontractive mappings are obtained.

### REFERENCES

- [1] Akuchu, B. G., *Strong convergence of the Mann sequence for demicontractive maps in Hilbert spaces*, Adv. Fixed Point Theory, **4** (2014), No. 3, 415–419
- [2] Berinde, V., *Approximating fixed points of weak contractions using the Picard iterations*, Nonlinear Analysis Forum, **9** (2004), No. 1 43–53
- [3] Boonchari, D. and Saejung, S., *Construction of common fixed points of a countable family of  $\lambda$ -demicontractive mappings in arbitrary Banach spaces*, Appl. Math. Comput., **216** (2010) 173–178
- [4] Chidume, C. E., Abbas, M. and Ali, B., *Convergence of the Mann iteration algorithm for a class of pseudocontractive mappings*, Appl. Math. Comput., **194** (2007), No. 1, 1–6
- [5] Chidume, C. E. and Maruster, S., *Iterative methods for the computation of fixed points of demicontractive mappings*, J. Comput. Appl. Math., **234** (2010), No. 3, 861–882
- [6] De la Sen, M., *Some combined relations between Contractive mappings, Kannan mappings, Reasonable Expansive mappings, and T-stability*, Fixed Point Theory Appl., Hindawi Publ. Corp., **2009**, Art. ID 815637
- [7] Hicks, T. L. and Kubicek, J. D., *On the Mann iteration process in a Hilbert spaces*, J. Math. Anal. Appl., **59** (1977) 489–504
- [8] Kang, S. M., Rafiq, A. and Hussain, N., *Weak and strong convergence of fixed points of demicontractive mappings in smooth Banach spaces*, Int. J. Pure Appl. Math., **84** (2013), No. 3, 251–268
- [9] Kannan, R., *Some results on fixed points*, Bull. Calcutta. Math. Soc., **60** (1968), 71–76
- [10] Kikkawa, M. and Suzuki, T., *Some similarity between contractions and Kannan mappings*, Fixed Point Theory Appl., **2008**, Art. ID 649749
- [11] Lee, W. and Choi, Y., *A survey on characterizations of metric completeness*, Nonlinear Anal. Forum, **19** (2014), 265–276
- [12] Marușter, St., *Sur le calcul des zeros d'un operateur discontinu par iteration*, Canad. Math. Bull., **16** (1973), No. 4, 541–544
- [13] Marușter, St., *The solution by iteration of nonlinear equations in Hilbert spaces*, Proc. Amer. Math.Soc., **63** (1977), No. 1, 69–73
- [14] Marușter, L. and Marușter, St., *Strong convergence of the Mann iteration for  $\alpha$ -demicontractive mappings*, Mathematical and Computer Modeling, **54** (2011), No. (9-10), 2486–2492
- [15] Ortega, J. M. and Rheinboldt, W. C., *Iterative Solution of Nonlinear Equations in Several Variable*, Academic Press, New York, 1970
- [16] Osilike, M. O., *Stability results for fixed point iteration procedures*, J. Nigerian Math. Soc., **14/15** (1995/96), 17–29
- [17] Păcurar, M., *Iterative methods for fixed point approximation*, Ed. Risoprint, Cluj-Napoca (2009)
- [18] Qing, Y. and Rhoades, B. E., *T-stability of Picard iteration in metric spaces*, Fixed Point Theory Appl, Hindawi Publ. Corp., **2008**, Art. ID 418971
- [19] Rhoades, B. E., *A comparison on various definitions of contractive mappings*, Trans. Amer. Math. Soc., **226** (1977) 259–290
- [20] Rus, I. A., *Picard operators and applications*, Sc. Math. Japonicae, **58** (2003), No. 1, 191–219
- [21] Rus, I. A., *An abstract point of view on iterative approximation of fixed points: impact on the theory of fixed point equations*, Fixed Point Theory, **13** (2012), No. 1, 179–192
- [22] Shioji N., Suzuki, T. and Takahashi, W., *Contractive mappings, Kannan mappings and metric completeness*, Proc. Amer. Math. Soc., **126** (1998), No. 10, 3117–3124
- [23] Shioji, N., Suzuki, T. and Takahashi, W., *Contractive mappings, Kannan mappings and metric completeness*, Proc. Amer. Math. Soc., **126** (1998), No. 10, 3117–3124
- [24] Subrahmanyam, P. V., *Completeness and fixed points*, Monasth. Math., **80** (1975), 325–330
- [25] Yu, Y. and Sheng, D., *On the strong convergence of an algorithm about Firmly Pseudo-Demicontractive mappings for the split common fixed point problem*, Hindawi Publishing Corporation, J. Appl. Math. 2012, Art. ID 256930, 9 pp.

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