

## FIXED DISCS IN QUASI-METRIC SPACES

HASSEN AYDI\*, NIHAL TAŞ\*\*, NIHAL YILMAZ ÖZGÜR\*\*\* AND NABIL MLAIKI\*\*\*\*

\*Nonlinear Analysis Research Group, Ton Duc Thang University, Ho Chi Minh City, Vietnam  
Faculty of Mathematics and Statistics, Ton Duc Thang University, Ho Chi Minh City, Vietnam  
Université de Sousse, Institut Supérieur d'Informatique et des Techniques de Communication,  
H. Sousse 4000, Tunisia

China Medical University Hospital, China Medical University, Taichung 40402, Taiwan  
E-mail: [hassen.aydi@tdtu.edu.vn](mailto:hassen.aydi@tdtu.edu.vn)

\*\*Balıkesir University, Department of Mathematics, 10145 Balıkesir, Turkey  
E-mail: [nihaltas@balikesir.edu.tr](mailto:nihaltas@balikesir.edu.tr)

\*\*\*Balıkesir University, Department of Mathematics, 10145 Balıkesir, Turkey  
E-mail: [nihal@balikesir.edu.tr](mailto:nihal@balikesir.edu.tr)

\*\*\*\*Prince Sultan University, Department of Mathematics and General Sciences,  
11586 Riyadh, Saudi Arabia  
E-mail: [nmlaiki@psu.edu.sa](mailto:nmlaiki@psu.edu.sa); [nmlaiki2012@gmail.com](mailto:nmlaiki2012@gmail.com)

**Abstract.** In this paper, we present some results of fixed disc and common fixed disc in quasi-metric spaces, under some very interesting contractions. Obtained results are supported by illustrative examples.

**Key Words and Phrases:** Fixed disc, common fixed disc, quasi-metric space, contraction.

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## REFERENCES

- [1] H. Afshari, S. Kalantari, H. Aydi, *Fixed point results for generalized  $\alpha - \psi$ -Suzuki-contractions in quasi-b-metric-like spaces*, Asian-Eur. J. Math., **11**(2018), no. 1, 1850012 (12 pages).
- [2] H.H. Alsulami, E. Karapınar, F. Khojasteh, A.F. Roldán-López-de-Hierro, *A proposal to the study of contractions in quasi-metric spaces*, Discrete Dyn. Nat. Soc., (2014), Article ID 269286, 10 pages.
- [3] H. Aydi,  *$\alpha$ -implicit contractive pair of mappings on quasi b-metric spaces and an application to integral equations*, J. Nonlinear Convex Anal., **17**(2016), no. 12, 2417-2433.

- [4] H. Aydi, A. Felhi, E. Karapınar, F.A. Alojail, *Fixed points on quasi-metric spaces via simulation functions and consequences*, J. Math. Anal., **9**(2018), no. 2, 10-24.
- [5] H. Aydi, M. Jellali, E. Karapınar, *On fixed point results for  $\alpha$ -implicit contractions in quasi-metric spaces and consequences*, Nonlinear Anal., Model. Control, **21**(2016), no. 1, 40-56.
- [6] H. Aydi, N. Taş, N.Y. Özgür, N. Mlaiki, *Fixed-discs in rectangular metric spaces*, Symmetry, **11**(2019), no. 2, 294.
- [7] S. Banach, *Sur les operations dans les ensembles abstraits et leur application aux equations integrals*, Fundam. Math., **2**(1922), 133-181.
- [8] V. Berinde, *Contractiții Generalizate și Aplicații*, **22**, Editura Cub Press, Baia Mare, 1997.
- [9] N. Bilgili, E. Karapınar, B. Samet, *Generalized  $\alpha - \psi$  contractive mappings in quasi metric spaces and related fixed point theorems*, J. Inequal. Appl., **2014**, 2014:36.
- [10] S.A. Chen, W. Li, D. Zou, S.B. Chen, *Fixed point theorems in quasi-metric spaces*, Proc. of the Sixth International Conference on Machine Learning and Cybernetics, Hong Kong, 19-22 August 2007, 2499-2504.
- [11] Şt. Cobzaş, *Functional Analysis in Asymmetric Normed Spaces*, Frontiers in Mathematics, Birkhäuser/Springer Basel, 2013. x+219 pp.
- [12] N.V. Dung, *Remarks on quasi-metric spaces*, Miskolc Math. Notes, **15**(2014), no. 2, 401-422.
- [13] E. Karapınar, S. Czerwik, H. Aydi,  *$(\alpha, \psi)$ -Meir-Keeler contraction mappings in generalized b-metric spaces*, J. Funct. Spaces, **2018**(2018), art. ID 3264620, 4 pages.
- [14] M. Khan, M. Swaleh, S. Sessa, *Fixed point theorems by altering distances between the points*, Bull. Aust. Math. Soc., **30**(1984), 1-9.
- [15] N. Mlaiki, N. Taş, N.Y. Özgür, *On the fixed-circle problem and Khan type contractions*, Axioms, **7**(2018), 80.
- [16] A. Mukheimer,  *$\alpha$ - $\psi$ - $\phi$ -contractive mappings in ordered partial b-metric spaces*, J. Nonlinear Sci. Appl., **7**(2014), no. 3, 168-179.
- [17] N.Y. Özgür, *Fixed-disc results via simulation functions*, Turkish J. Math. **43**(2019), no. 6, 2794-2805.
- [18] N.Y. Özgür, N. Taş, *Some fixed-circle theorems on metric spaces*, Bull. Malays. Math. Sci. Soc., **42**(2019), no. 4, 1433-1449.
- [19] N.Y. Özgür, N. Taş, *Some fixed-circle theorems and discontinuity at fixed circle*, AIP Conference Proceedings, **1926**, 020048 (2018).
- [20] R.P. Pant, N.Y. Özgür, N. Taş, *On discontinuity problem at fixed point*, Bull. Malays. Math. Sci. Soc., **43**(2020), no. 1, 499-517.
- [21] V.Ć. Rajić, *Some remarks on G-metric spaces and fixed point theorems*, Int. J. Anal. Appl., **5**(2014), no. 1, 102-114.
- [22] I.L. Reilly, P.V. Subrahmanyam, M.K. Vamanamurthy, *Cauchy sequences in quasi-pseudo-metric spaces*, Monatsh. Math., **93**(1982), 127-140.
- [23] N. Shahzad, O. Valero, *Fixed point theorems in quasi-metric spaces and the specialization partial order*, Fixed Point Theory, **19**(2018), no. 2, 733-749.
- [24] M.B. Smyth, *Completeness of quasi-uniform and syntopological spaces*, J. London Math. Soc., **49**(1994), 385-400.
- [25] N. Taş, N.Y. Özgür, N. Mlaiki, *New types of  $F_C$ -contractions and the fixed-circle problem*, Mathematics, **6**(2018), no. 10, 188.
- [26] A. Tomar, R. Sharma, *Some coincidence and common fixed point theorems concerning F-contraction and applications*, J. Int. Math. Virtual Inst., **8**(2018), 181-198.
- [27] D. Wardowski, *Fixed points of a new type of contractive mappings in complete metric spaces*, Fixed Point Theory Appl., **2012**, 2012:94.
- [28] W.A. Wilson, *On quasi-metric spaces*, Amer. J. Math., **53**(1931), no. 3, 675-684.

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