The analysis shows that the tensile strength of loess is significantly affected by disturbance [18].

5. CONCLUSIONS

This paper improves the horizontal axial soil tensile tester, and uses the improved tester to test the tensile properties of remolded and undistributed loess of different dry densities and water contents. Based on the test data, the author analyzed and explained the difference between the two types of loess in tensile properties. The main conclusions are as follows:

(1) To make the traditional tester more scientific and rigorous, height-adjustable scale bolts were added to adjust the inclination of the plate and counteract the static friction; the scale and axis were marked, and a manual adjuster was installed to keep the tensile force on the axis, aiming to minimize the error.

(2) The tensile strength of remolded loess specimens first increased to the peak value and then gradually declined, with the growth in water content. The tensile strength curves generally took the wavy pattern. As for undisturbed loess specimens, the tensile strength increased with dry density when the water content stayed the same, and decreased with water content when dry density remained the same.

(3) The most significant difference between undisturbed and remolded loess in tensile properties lies in the shape of the tensile strength-water content curve at a constant dry density: the tensile strength of undisturbed loess continues to decline, while that of remolded loess exhibits as a wave (first increases to the peak and then gradually decrease). The difference is attributable to the incomplete reaction between cementing materials and water in the remolding process, for the particle cohesion and matrix suction are not optimized.

ACKNOWLEDGMENT

The authors sincerely acknowledge the financial support from the State Key Program of National Science of China (Grant No. 41630634), Science and Technology Planning Project of Shaanxi (Grant No. 2019SF-233) and Science and Technology Burea of Yulin (Grant No. 2014cxy-04).

REFERENCES

[1] Li, C.Q. (2015). Study on tensile strength characteristics of loess. Lanzhou Jiaotong University. 2015.

[2] Wu, X.Y., Liang, Q.G., Li, C.Q., Wang, L.L., Sun, W.Y. (2014). Study on tensile properties of remolded loess in Jiuzhou development district, Lanzhou, China. China Earthquake Engineering Journal, 36(3): 562-568. https://doi.org/10.3969/j.issn.1000-0844.2014.03.0562

[3] Wang, L.M., Yuan, Z.X., Wang, G.L. (2013). Study on method for preliminary and detailed evaluation on liquefaction of loess sites. China Earthquake Engineering Journal, 35(1): 1-8. https://doi.org/10.3969/j.issn.1000-0844.2013.01.0001

[4] Wang, J.E., Xiang, W., Bi, R.N. (2011). Experimental study of influence of matric suction on disintegration of unsaturated remolded loess. Rock and Soil Mechanics, 32(11): 3258-3262. https://doi.org/10.3969/j.issn.1000-7598.2011.11.010

[5] Jing, Y.L., Wu, Y.Q., Lin, D.J., Hu, Z.P., Li, X.G., Zhang, Z.Q. (2011). Study of relationship between loess collapsibility and index of compaction test. Rock and Soil Mechanics, 32(2): 393-397. https://doi.org/10.3969/j.issn.1000-7598.2011.02.012

[6] Luo, Y.S., Hu, Z.S., Zhang, A.J. (2009). Regularity of relation between structural parameter and strength indexes of unsaturated loess. Rock and Soil Mechanics, 30(4): 943-948. https://doi.org/10.3969/j.issn.1000-7598.2009.04.014

[7] He, S.X. (2016). Experimental research on tensile characteristics of loess. Shijiazhuang Tiedao University, 2016.

[8] Kim, T.H., Hwang, C. (2003). Modeling of tensile strength on moist granular earth material at low water content. Engineering Geology, 69(3/4): 233-244. https://doi.org/10.1016/S0013-7952(02)00284-3

[9] Tamrakar, S.B., Mitachi, T., Toyosawa, Y. (2007). Measurement of soil tensile strength and factors affecting its measurements. Soils and Foundations, 47(5): 911-918. https://doi.org/10.1007/3-540-69873-6_20

[10] Lu, N., Wu, B., Tan, C.P. (2007). Tensile strength characteristics of unsaturated sands. Journal of Geotechnical and Geoenvironmental Engineering, 133(2): 144-154. https://doi.org/10.1061/(asce)1090-0241(2007)133:2(144)

[11] Wang, Y.H., Ni, W.K., Yuan, Z.H. (2015). Study on the test method for tensile strength of undisturbed loess. Science Technology and Engineering, 15(07): 234-237+247. https://doi.org/10.3969/j.issn.1671-1815.2015.07.045

[12] Li, C.Q., Liang, Q.G., Wu, X.Y., Wang, L.L., Xu, S.C. (2014). Study on the test of tensile strength of remolded loess. China Earthquake Engineering Journal, 36(02): 233-238+248. https://doi.org/10.3969/j.issn.1000-0844.2014.02.0233

[13] Dang, X.Q., Hao, Y.Q., Li, J. (2001). Study on tensile strength of unsaturated loess. Journal of Hohai University (Natural Sciences), 29(6): 106-108. https://doi.org/10.3321/j.issn:1000-1980.2001.06.025

[14] Sun, C. (2017). Study on the test of tensile strength of loess in the south of Jinghe. Chang'an University, 2017.

[15] Yuan, Z.H., Ni, W.K., Tang, C., Huang, C., Wang, Y.H. (2017). Experimental study on tensile strength of loess under dry and wet cycling. Chinese Journal of Rock Mechanics and Engineering, 36(S1): 3670-3677. https://doi.org/10.13722/j.cnki.jrme.2016.0230

[16] Sun, W.Y., Liang, Q.G., Yan, S.H., Ou, E.F., Shao, S.L. (2015). Experimental study on tensile strength of Q_2 undisturbed loess in Yan'an Shanxi China. Journal of Geomechanics, 21(03): 386-392.

[17] Sun, W.Y., Liang, Q.G., Ou, E.F., Yan, S.H., Zhang, Y.W. (2015). Comparative experimental study on tensile strength of undisturbed and remolded Q_2 Loess from Yan'an Shanxi China. China Civil Engineering Journal, 48(S2): 53-58.

[18] Sun, M.X., Dang, J.Q., Kang, S.X. (2006). Tensile character of disturbed loess. Journal of Xi'an University of Arts and Science (Natural Science Edition), 9(3): 59-61. https://doi.org/10.3969/j.issn.1008-5564.2006.03.015