Unified algorithm for bearing capacity of concrete-filled steel tubular long columns with different cross sections

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Abstract: To study the unified algorithm for bearing capacity of concrete filled steel tubular long columns with different cross sections, the bearing capacity test results of 401 concrete-filled steel tubular long columns with different cross sections are collected. The bearing capacity of 401 concrete-filled steel tubular long columns was calculated by using the calculation method of the bearing capacity of GB 50936—2014 code for design of concrete-filled steel tubular structures, and compared with the test results. Then the accuracy, safety and applicability of GB 50936—2014 calculation method for bearing capacity are analyzed. Finally, on the basis of the analysis of the influence of the parameters of the constraint coefficient, section form, relative eccentricity and slenderness ratio on the GB 50936—2014 calculation method of the bearing capacity, the unified calculation formula of the bearing capacity of concrete-filled steel tubular long columns with different cross sections is proposed. The results show that the GB 50936—2014 calculation method of the bearing capacity has higher accuracy, but its discreteness is large, and the proportion of non-conservative estimation data points is about 50.51%, and the GB 50936—2014 calculation result is unsafe. The unified calculation formula of the bearing capacity is applicable to the calculation of the bearing capacity of concrete-filled steel tubular long columns with different cross sections. The average ratio of the calculation value to the test value is 0.938, the variance is 0.025, and the calculation result is less discrete-time and the proportion of the non-conservative estimation data point is low, only 23.08%. The calculation results of the unified calculation formula of the bearing capacity are more safe.

Keywords: Concrete filled steel tubular long columns, bearing capacity, calculation formula, test