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A numerical approach to predict soil bearing potential for isolated footing

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The success of any civil engineering structure's foundation design depends upon the accuracy of estimation of soil's ultimate bearing capacity. Numerous numerical approaches have been proposed to estimate the foundation's bearing capacity value to avoid repetitive and expensive experimental work. All these models have their advantages and disadvantages. In this study, we compiled all the governing equations mentioned in Bureau of Indian standard IS:6403-1981 and modify the equation for Ultimate Bearing Capacity. The equation was modified by considering two new parameters, K1(for general shear) and K2 (for local shear) so that a common governing equation can be used for both general and local shear failure criteria. The program used for running the model was written in MATLAB language code and verified with the observed field data. Results indicate that the proposed model accurately characterized the ultimate, safe, and allowable bearing capacity of a shallow footing at different depths. The correlation coefficients between the observed and model-predicted bearing capacity values for a 2m foundation depth with footing size of 1.5 ×1.5, 2.0 × 2.0, and 2.5 × 2.5 m are 0.95, 0.94, and 0.96. A similar result was noted for the other foundation depth and footing size. Findings show that the model can be used as a reliable tool for predicting the bearing capacity of shallow foundations at any given depth. Moreover, the formulated model can also be used for the transition zone between general and local shear failure conditions.