以演化運算樹及非線性迴歸探討高性能混凝土在不同水膠比下的強度模型

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摘要

This study aimed to establish the strength models of High-Performance Concrete (HPC) at different ranges of water binder ratio (W/B) using Genetic Operation Trees (GOT), Nonlinear Regression Analysis (NLRA) and Back-Propagation Networks (BPN), and to compare their accuracy, and to explored the variations of these models at different ranges of water binder ratio. A large number of experimental datasets were used to compare accuracy of the three modeling methods. The results showed: (1) The approach separating the experimental data into three subsets according to their W/B is more accurate than the one using the whole experimental data. (2) If users only need to build accurate strength model and not to build an understandable and explicit one, BPN is the most suitable among the three modeling methods. (3) GOT can produce self-organized formulas, which is an important advantage to developing novel materials. (4) Slag has lower contribution to strength of concrete at low W/B but higher contribution at high W/B. Conversely, fly ash has higher contribution to strength of concrete at low W/B but lower contribution at high W/B.

關鍵字： strength, high-performance concrete, water-binder ratio, genetic operation trees, nonlinear regression analysis, back-propagation networks.