Data Fusion Based Settlements Prediction Of Adjacent Structures Impacted By Tunneling In Soft Soils

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Settlement prediction of the adjacent structures is essential to the safety assessment of the tunnel construction. A new data fusion approach is presented for settlement prediction of adjacent structures using field monitoring data. Both the 3D finite element method (FEM) and the response surface method (RSM) are used to establish the relationships among monitoring data and uncertain soil parameters. Then a Bayesian network model is adopted to make an inverse analysis using the field monitoring data during the tunnel construction. Based on the parameters of inverse analysis, settlements of the adjacent buildings are predicted using the FEM and RSM models. A case study of adjacent structure settlement prediction is presented to illustrate the proposed methodology in the end. Based on the case study, it is concluded that the data fusion method provide an efficient dynamic manner to make prediction of adjacent structures which can take field monitoring data into consideration.