# Measuring Uncertainty of Spatial Features in a Three-Dimensional Geographical Information System Based upon Numerical Analysis

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**Abstract**

This paper defines an uncertainty description – a discrepancy that is a deviation of a measured value from its 'true' value – for three-dimensional (3D) vector data and proposes an uncertainty measure to quantify the uncertainty description. In an existing research issue, uncertain 3D spatial features was simulated and compared with the 'true' location of the spatial features in order to estimate an average value of a discrepancy of the spatial features. However, this time-consuming method cannot provide a precise and highly accurate solution. This study further proposes the development of a numerical uncertainty model for 3D spatial features. The expected value of the discrepancy is expressed as a multiple integral and solved by a numerical integration technique. Some preliminary test results from experimental data are summarized and compared with those from the earlier simulation model.