Complex uncertainty of surface data modeling via the type-2 fuzzy B-spline model

ABSTRACT

This paper discusses the construction of a type-2 fuzzy B-spline model to model complex uncertainty of surface data. To construct this model, the type-2 fuzzy set theory, which includes type-2 fuzzy number concepts and type-2 fuzzy relation, is used to define the complex uncertainty of surface data in type-2 fuzzy data/control points. These type-2 fuzzy data/control points are blended with the B-spline surface function to produce the proposed model, which can be visualized and analyzed further. Various processes, namely fuzzification, type-reduction and defuzzification are defined to achieve a crisp, type-2 fuzzy B-spline surface, representing uncertainty complex surface data. This paper ends with a numerical example of terrain modeling, which shows the effectiveness of handling the uncertainty complex data.