Numerical Representation of 3D Object by Means of Implicit Surface
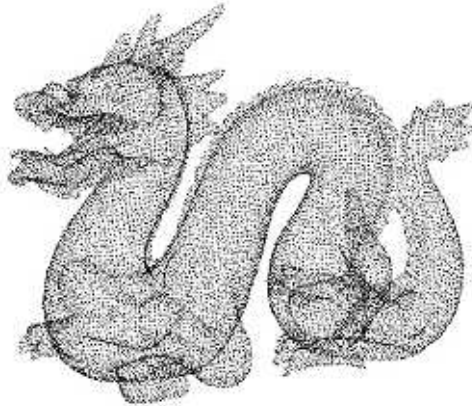
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Fig. 1. Discrete points on a 3D object, the coordinates of which are measured by using a laser scanner.

Fig. 2. The implicit surface reconstructed on the basis of the discrete points.

Content   A polygon representation has been so far used for drawing 3-dimensional objects. However, both enormous memory requirements and tremendous operation counts are indispensable for depicting a smooth object surface.

   In the present study, discrete points on an object are measured by using a laser scanner or a CT (see Fig. 1) and, subsequently, all the points are interpolated to numerically determine an implicit surface $f(\boldsymbol{x}) = 0$ (see Fig. 2). This method has a following merits:

1) An object surface can be drawn smoothly.

2) A morphing can be realized by calculating a new implicit function from multiple implicit functions.

3) Reconstruction of multiple objects can be processed with a high speed.

In this sense, this method can become a powerful tool for the CG technology.

   In the present study, a high-performance method for determining a implicit surface is to be developed. In addition, the resulting method is also applied to both the structural analysis and the electromagnetic analysis.

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