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Fully free-form deformation features for aesthetic shape design

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Author(s): Pernot JP, Falcidieno B, Giannini F, Leon JC

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Abstract: Geometric models, such as B-Rep or CSG, are often used as a shared reference representation of the product along the whole design process. However, they do not provide capabilities for conveying complex information related to the involved product development tasks. This also applies for the initial styling activity, in which the shape is described by complex mathematical models handled by tools still not sufficiently suited to the creative designer mentality. To overcome these limits, we introduce the so-called Fully Free-Form Deformation Features (delta-F-4) concept and the related manipulation tools. Advantages of both the free-form surface deformation method and the feature-based approach are combined to define these high-level modelling entities enabling the direct shape-oriented modification of surfaces through a restricted set of parameters. They are mainly defined by characteristic curves in order to better cope with the curve-oriented designers' way of working. In addition, a (delta-F-4) classification is proposed to enable a fast access to the desired shape. The proposed approach is illustrated with some examples from our prototype software.

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