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Visualization of Potential Sink Marks using Thickness Analysis of Finely Tessellated Solid Model

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Abstract

Sink marks are unwanted shallow depressions on the molded plastic surface caused by localized shrinkage during the hardening process of injection molding. Sink marks appearing in the exterior impair the aesthetic quality of the product. In this study, a novel method for extracting potential sink marks that can occur on the part surface is proposed. The thicker portion of the part shrinks with a greater amount than that of the thinner portion. This difference in the shrinkage amount is the main cause of the sink mark. In the plastic part design practice, engineers often check the thickness distribution to predict potential sink marks in the part surface. Our method can be considered as an automated technique of such manual inspection task. A polyhedral solid model of the part with sufficiently small triangles of nearly the same size is prepared. The amount of shrinkage at each polygon is estimated based on its thickness and the shrinkage ratio of the part. The developed algorithm extracts the potential sink marks by analyzing the shrinkage distribution on the part surface.

Key words: sink marks, shrinkage analysis, sphere method, solid modeling, CAD

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