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Blend recognition from CAD mesh models using pattern matching

AIP Conference Proceedings **2148**, 030029 (2019); <https://doi.org/10.1063/1.5123951>Vaibhav J. Hase^{1,a)}, Yogesh J. Bhalerao^{2,b)}, Saurabh Verma^{3,c)}, and G. J. VIKHE^{4,d)}[View Affiliations](#)

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ABSTRACT

This paper reports a unique, platform-independent approach for blend recognition from CAD mesh model using pattern matching. About 60% of the average portion of the total facets in CAD mesh model is blended features. So, it becomes essential and necessary to extract these blend features for the successful accomplishment of seamless CAD/CAM integration. The facets of the same region have similar patterns. The focus of this paper is to recognize the blends using hybrid mesh segmentation based on pattern matching. Blend recognition has been carried out in three phases viz. preprocessing, pattern matching hybrid mesh segmentation and blend feature identification. In preprocessing, the adjacency relationship is set in facets of CAD mesh model, and then Artificial Neural Networks based threshold prediction is employed for hybrid mesh segmentation. In the second phase, pattern matching hybrid mesh segmentation is used for clustering the facets into patches based on distinct geometrical properties. After segmentation, each facet group is subjected to several conformal tests to identify the type of

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analytical surfaces such as a cylinder, cone, sphere, or tori. In the blend feature recognition phase, the

rule-based reasoning is used for blend feature extraction. The proposed method has been implemented in VC++ and extensively tested on benchmark test cases for prismatic surfaces. The proposed algorithm extracts the features with coverage of more than 95 %. The innovation lies in “Facet Area” based pattern matching hybrid mesh segmentation and blend recognition rules. The extracted feature information can be utilized for downstream applications like tool path generation, computer-aided process planning, FEA, reverse engineering, and additive manufacturing.

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