

Representation of Swept Volumes in a Parametric CAD System using Trajectory Information from Virtual Environments

ABSTRACT: Swept volumes are the volumes created by a part moving in space during the process of assembly, disassembly, service, etc. Swept volumes represent important manufacturing, maintainability, and serviceability data. Several graphical and implicit modeling techniques are currently available to create and represent swept volumes as three- dimensional polygonal blobs. In this paper, we present a method for generating swept volumes from trajectory data created in a virtual graphics environment during an assembly/ disassembly scenario. The individual instances can be edited in the virtual environment by swept instance removal and modification of position and orientation of instances. Using a synchronous link between the virtual environment and the CAD system, the trajectory information from the virtual environment is used along with the parametric model in the CAD system to create swept volume geometry directly in a parametric CAD system as a feature of the assembly. In addition, using the synchronous link, this swept volume (not just instances along the trajectory) can then be exported back to the original virtual environment and displayed. This method can handle any sweeping trajectory and does not restrict the geometry or the topology requirement of the sweeping object. The swept volumes generated this way are accurate, concise, and can be easily processed by CAD systems. **KEYWORDS:** Swept volume, User Defined Features, Assembly Modeling, Virtual Assembly