

Constrained Motion Simulation and Constraint Management in Virtual Assembly

ABSTRACT: The Virtual Assembly Design Environment (VADE) is an immersive virtual environment that allows engineers to perform assembly design and evaluation tasks with the assistance of a comprehensive set of advanced input/output devices. One of its many features is that the system captures the designer's intent by using constrained motion simulation. The constraints (axial, planar, etc.) are extracted from the assembly models designed in CAD systems and are simulated during the virtual assembly operation to more accurately reflect real world assembly operations. In this paper, a complete analysis of combinations and application orders of axial and planar constraints used in assembly is given. The methods and algorithms for checking and applying the constraints in the assembly operation are provided. The model and the techniques for managing these constraints and their parts in the assembly are discussed. The constraints used in the virtual assembly operation can be recorded enabling further evaluation of the assembly process.