

Defining Rules for Kinematic Shapes with Variable Spatial Relations

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Abstract. Designing mechanisms can be a challenging problem, because the underlying kinematics involved are typically not intuitively incorporated into common techniques for design representation. Kinematic shapes and kinematic grammars build on the shape grammar and making grammar formalisms to enable a visually intuitive approach to model and explore mechanisms. With reference to the lower kinematic pairs this paper introduces kinematic shapes. These are connected shapes with parts which have variable spatial relations that account for the relative motion of the parts. The paper considers how such shapes can be defined, the role of elements shared by connected parts, and the motions that result. It also considers how kinematic shape rules can be employed to generate and explore the motion of mechanisms.

Keywords: Shape grammars, kinematic design, making grammars, boundaries.