A Graph Grammar Approach for Structure Synthesis of Mechanisms

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ABSTRACT

This paper presents a general graph grammar methodology for structure synthesis of

mechanisms. Much of current mechanism design is based on a systematic method

popularized by Freudenstein, Mruthyunjaya, and Tsai (among others). A graph grammar

is a more natural expression for a method that relies on algebraic abstractions of graph

theoretic principles. Our proposed grammar rules add vertices and loops to a start graph

to obtain desired structural requirements. A grammar adaptation of an existing linear

time algorithm for the detection of isomorphism is presented. Also presented is a

specialized grammar for the structure synthesis of Epicyclic Gear Trains. A valid graph

grammar for structure synthesis of mechanisms enables both the eventual automation of

general atlas construction and atlas construction for customized mechanism classes. .