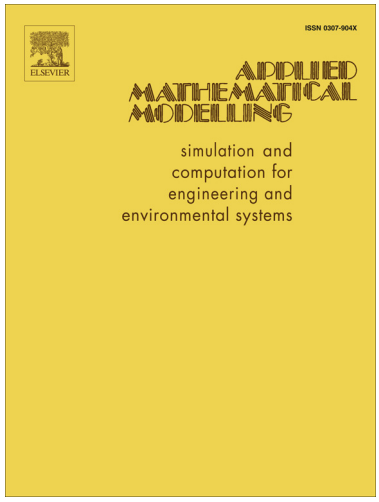

The significance of adopted Lagrange's principle of virtual work used for modeling aerial robots

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The significance of adopted Lagrange's principle of virtual work used for modeling aerial robots☆

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Abstract

This paper presents a novel approach for kinematic and dynamic (kinetic) modeling of the selected aerial robot type, named $CPR-A$. The presented $CPR-A$ system has three motors and two ropes connected together with a camera which can move in the $3D$ parallelepiped workspace. The $CPR-A$ workspace is maximized for non-redundant construction. The unique kinematic model of the considered system represents the fundamental base for its dynamic model. This complex model accurately represents a real $CPR-A$ system, which can be used for various tasks by implementing intelligent control systems. The validity of the results has been presented through five case studies using newly developed software package $AIRCAMA$. The purpose of this research is to implement the presented results and possibly advance the model for future endeavors, autonomy and intelligent behavior of aerial robots.

Keywords: aerial robot; calculation of workspace; kinematic modelling; Jacobian matrix; trajectory planning; dynamic modeling.

Nomenclature

DOF	Degree Of Freedom

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