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Kinematic and dynamic analysis of planar mechanisms by means of the SolidWorks software

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Abstract

The paper presents a kinematic and dynamic analysis of a planar mechanism by means of the SolidWorks software. Graphic dependence of kinematic and dynamic magnitudes of some points is given in dependence on the angle of rotation of the driving item and on the time.

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Keywords: kinematic analysis; dynamic analysis; finite element method; numerical analysis; SolidWorks; planar mechanism;

1. Introduction

In relation to the kinematic and dynamic analysis and subsequent simulation [1-3] of the planar as well as spatial mechanisms, it is great solution to use SolidWorks software. The considerable advantage of this mentioned program is based on its simplicity from the aspect of modelling and moreover, it is important to point out that utilisation of the mentioned program leads to results which are precise and accurate in the case of the numerical solution of the equations in the whole magnitude referring to motion of mechanism while the given results are obtained in the graphic form.

2. Kinematic and dynamic analysis planar mechanism

The planar mechanism Fig. 1 representatives consisting of six bodies. Using the kinematic analysis, the main objective is connected with the determination and entering of the position domains, speed (velocity) domains as well as acceleration of the individual bodies in relation to the specified input values of the angular velocity for the driving body designated as 2. The angular velocity for body designated as 2 is specified $\omega_{21} = 36\ s^{-1}$.

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Input values:

a = 1.7 [m], b = 1.3 [m], c = 0.1 [m], h = 0.1 [m] (thickness bodies), l_2 = 0.5 [m], l_3 = 0.1 [m], l_4 = 1.4 [m], l_5=1.4 [m], l_6 = 0.9 [m].

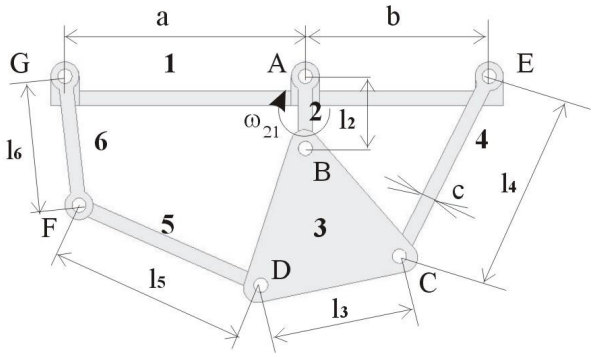

Fig. 1. Planar mechanism.

The simulation of operation relating to planar mechanism can be seen in the Fig. 2 for time step ten second

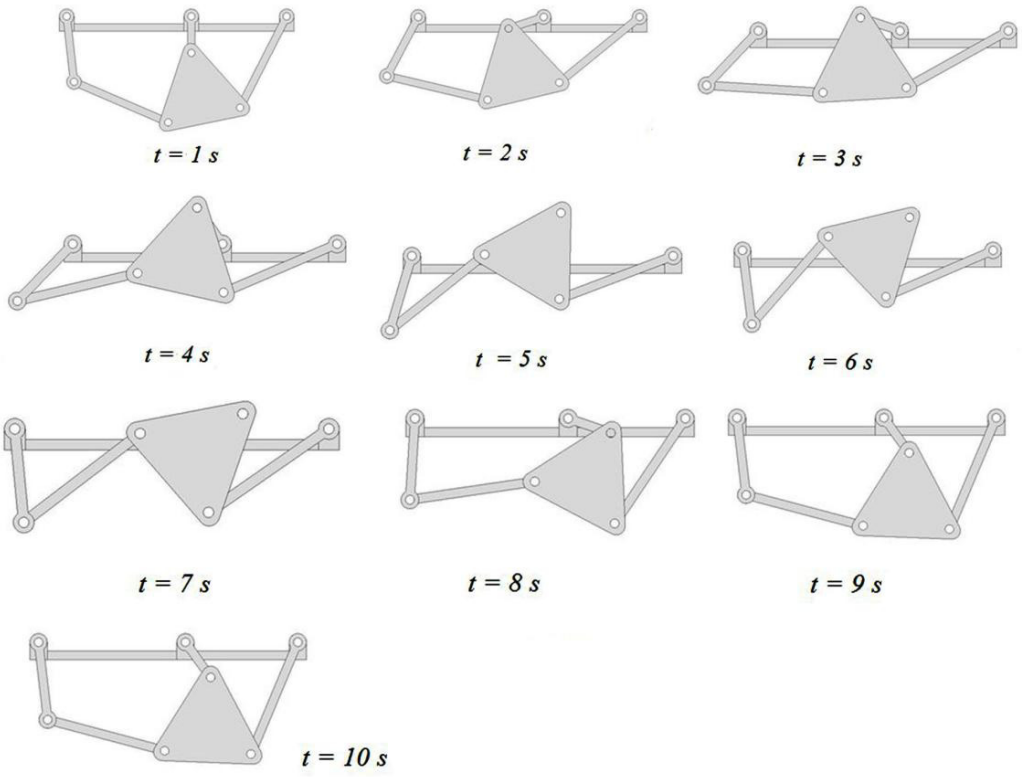

Fig. 2. Simulation of planar mechanism operation.