Environmental Engineering and Management Journal

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UNITARY KINEMATIC ANALYSIS AND SYNTHESIS OF THE SYMMETRICAL SEVEN-BAR LINKAGES FOR THE DESIGN OF A MEDICAL DISINFECTION ROBOT

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Abstract

The paper presents the type synthesis and the unitary kinematic analysis and synthesis of different configurations of the symmetrical seven-bar linkages. The type synthesis led to the development of symmetrical seven-bar linkages with both revolute and prismatic joints. From these, two configurations of seven-bar linkages were identified and studied. The purpose of the paper is, besides providing a unitary analysis and synthesis of the symmetrical seven-bar linkages, to highlight which folding mechanism structure is the most feasible for the design of a medical disinfection robot. The optimal structure should have small dimensions and provide at the same time the largest height variation of the mechanism between the minimum configuration and the maximum configuration. These aspects ensure that the robot will be able to disinfect both large environments and areas with limited space. Since currently available disinfection robots have a bulky design and cannot operate in multiple configurations, they cannot disinfect hard-to-reach areas, therefore the best way to improve the environmental disinfection is to use disinfection robots with folding mechanisms.

Key words: disinfection robots, kinematic analysis, seven-bar linkages, synthesis

Received: November, 2024; Revised final: June, 2025; Accepted: July, 2025

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