

## Optimal Design of Redundant Hybrid Manipulator for Minimum Singularity

**Authors :** Arash Rahmani, Ahmad Ghanbari, Abbas Baghernezhad, Babak Safaei

**Abstract :** In the design of parallel manipulators, usually mean value of a dexterity measure over the workspace volume is considered as the objective function to be used in optimization algorithms. The mentioned indexes in a hybrid parallel manipulator (HPM) are quite complicated to solve thanks to infinite solutions for every point within the workspace of the redundant manipulators. In this paper, spatial isotropic design axioms are extended as a well-known method for optimum design of manipulators. An upper limit for the isotropy measure of HPM is calculated and instead of computing and minimizing isotropy measure, minimizing the obtained limit is considered. To this end, two different objective functions are suggested which are obtained from objective functions of comprising modules. Finally, by using genetic algorithm (GA), the best geometric parameters for a specific hybrid parallel robot which is composed of two modified Gough-Stewart platforms (MGSP) are achieved.

**Keywords :** hybrid manipulator, spatial isotropy, genetic algorithm, optimum design

**Conference Title :** ICMMME 2015 : International Conference on Mechanical, Materials and Mechatronics Engineering

**Conference Location :** Paris, France

**Conference Dates :** December 30-31, 2015