

MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Specialized Technologies, including Nanotechnology (8)

Author: Mr. Ali Ghanbari  
Amirkabir University of Technology, Iran, a\_gh\_ir@yahoo.com

Prof. Mohsen Bahrami  
Aerospace Research Institute, Iran, mbahrami@ari.ac.ir

DEVELOPMENT OF A SWIMMING MICROROBOT FOR BIOMEDICAL APPLICATIONS IN SPACE

**Abstract**

Microelectromechanical systems (MEMS) and nanoelectromechanical systems (NEMS) technology have brought new promises for treatment of diseases in a more accurate way and less side effects. Tiny MEMS/NEMS components and devices created by micromachining technology can be integrated into a microrobot and entered into the human body with minimum interferences. Miniaturization of robots makes them particularly useful for medical applications in space. Microrobots can be used for earth-based or space-based biomedical treatments such as precise drug delivery to diseased or defected organs inside the human body or minimally invasive surgery. Biomedical microrobots can establish a useful link between two key technology fields: Space and MEMS technology, a large scale technology and a miniature technology. In this paper a microrobot is proposed for swimming in human bodily fluids for earth-based or space-station-based biomedical applications such as critical care monitoring, diagnosis and possible treatments. The methodology of swimming based on ciliary motion is explained. The related hydrodynamic model is written to find the velocity of the microrobot. The proposed microrobot eliminates the need for surgeon in space.