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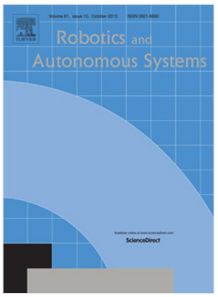

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Yue Zhao, Xun Chai, Feng Gao, Chenkun Qi

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Obstacle avoidance and motion planning scheme for a hexapod robot Octopus-III

Yue Zhao, Xun Chai, Feng Gao* & Chenkun Qi

State Key Laboratory of Mechanical System and Vibration, Department of Mechanical Engineering, Shanghai Jiao Tong University, Shanghai 200240, China

* Corresponding author (email: fengg@sjtu.edu.cn)

Abstract Legged robots have advanced potential to move in complex environment accomplishing operating, rescuing and detecting tasks. In real applications, bypassing large obstacles is a more common choice for legged robots comparing with walking over and climbing the obstacles. However, few papers involve the obstacle avoidance approach for legged robots. An obstacle avoidance and motion planning scheme for a hexapod robot is presented in this paper. The scheme takes advantage of the superior mobility of the legged robot and fulfils requirements of walking stability and kinematic feasibility. Firstly, a novel obstacle avoidance trajectory planning method is proposed, which is inspired by the superior mobility of the legged robot. Then, a motion generation approach for the legged robot is developed to control the robot to walk along the planned trajectory. The approach coordinates the body motion and the feet motions to fulfil requirements of walking stability and kinematic feasibility simultaneously. Finally, the scheme is integrated on a hexapod robot and tested by real experiments.

Keywords obstacle avoidance, hexapod robot, trajectory planning, gait motion generation, parallel mechanism

1. INTRODUCTION

Frequent occurrence of natural and man-made disasters greatly prompts public desire for the robots' help. For operating, detecting and rescuing applications, mobile robots are so valuable that they could take the place of human beings to enter into the hazardous environment. In such applications, legged robots have advanced potential to navigate in complex environment compared with their wheeled counterparts [1]. Because they only need some discrete footholds for walking. In recent years, researches have attached more and more importance on legged robots [2-5]. While executing tasks in complex environment, legged robots can choose to bypass, walk over or climb the obstacles based on different features of the obstacles. Most related works [6-12] concentrate on control schemes which enable legged robots to walk over obstacles and