論　文　要　旨
Thesis Abstract

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主論文題名　（Title）

Gait-Behavior Optimization Considering Arm Swing and Toe Mechanisms for Biped Robot on Rough Road

内容の要旨　（Abstract）

This research addresses a gait generation approach for the biped robot which is based on considering that a gait pattern generation is an optimization problem with constraints where to build up it, Response Surface Model (RSM) is used to approximate objective and constraint function, afterwards, Improved Self-Adaptive Differential Evolution Algorithm (ISADE) is applied to find out the optimal gait pattern for the robot. In addition, to enhance stability of walking behavior, I apply a foot structure with toe mechanism. This is to enable the robot to overcome the challenge on uneven terrain. Arm swing mechanism is also considered to restrict rotation of the robot during locomotion. Finally, to evaluate the achievement of this research, the result is validated through dynamic simulation on a commercially available software called Adams (MSC software, USA) with the model which is designed by referring to KHR-3HV robot, belongings to Kondo Kagaku company. The robot posture is comparable to the human in a cycle of the walking process. As a result, I confirmed that the approximated optimization method by applying ISADE algorithm and RSM is an effective approach to generate a gait pattern for the robot. With generated gait, the robot can walk steadily on flat ground and overcomes obstacle on rough road. Toe mechanism enhances ability of the robot while climbing up uneven segment of rough terrain and arm swing mechanism reduces angle of rotation in motion.

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