

Study on the lower level adaptive walking by a biped locomotion robot

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The walking according to change of various environments is called an adaptive walking. We define the lower level adaptive walking as the walking consisted of only trajectory control and walk-pattern generation. The purpose of this study is to realize the lower level adaptive walking in sagittal plane by a biped locomotion robot in indoor space.

The following three points are shown in this paper.

- (1) For the single leg supporting phase making a forward step, we analyze the dynamics and show that dynamic control is useful for trajectory control of a biped locomotion robot.
- (2) For the double legs supporting phase with kick motion, in which the dynamic states (floor reactions, joint torques) are restricted, we propose the analysis based on D'Alembert's principle, in which static forces are derived from static equilibrium equations for links.
- (3) We propose the simplified procedure of walk-pattern generation as following that walk-patterns for various environments are generated by adjusting and combining basic walk-patterns which are previously given for typical environments.

Based on these ideas, walking experiments are carried out for various environments. As a result, the lower level adaptive walking in various stairs (up, down) are realized.