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Investigation of difference of fundamental diagrams in pedestrian flow

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Abstract

In this paper the difference of fundamental diagrams in pedestrian flow is investigated. A new measurement method in which the moving back is considered as negative contribution to pedestrian flow is proposed based on previous study. Firstly the comparison of different measurement methods is made and small discrepancy in the fundamental diagrams of the same experiment is observed. In order to remove the effect of different measurement methods on final results, we compare the fundamental diagrams of Chinese and German experiments by using the same measurement method and surprisingly large difference is found. From the analysis of experimental video, it is observed the motivation and competitiveness of participants in two experiments are quite different, which plays a dominant role on the large difference between fundamental diagrams. To make it more tenable, we further analyze two German experiments (Hermes experiment and BaSiGo experiment) in which the participants have the same average age. The free velocity is adopted to measure pedestrian's motivation in the experiment and the analysis results confirm that the discrepancy of motivation and competitiveness of participants in different experiments leads to the large difference in the fundamental diagrams. The study may be helpful to understand the effect of pedestrian behavior on global flow and microscopic dynamics.

Keyword: Pedestrian flow; Fundamental diagrams; Experiment; Motivation

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