Meiji University Global COE Program

57th Mathematical Sciences based on Modeling, Analysis and Simulation seminar

Date: January 17, 2013, 16:30～18:00

Location: Meiji Univ. Ikuta Campus, Build 2 Annex A, Room A207.

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Title : Pedestrian Dynamics: Experiments, Measurements and Modeling

Abstract : Pedestrian dynamics can be defined as the study of properties and characteristics emerging from the collective motion of pedestrians. In everyday life a pedestrian moves in space freely without any restrictions from his environment. However, up the time where a pedestrian enters a building or an area where in the same time other pedestrians reside, this "freedom" of movement becomes manifestly restricted. In such cases security concerns rise and necessitate thoroughly understanding of the dynamics. In the past several aspects of pedestrian dynamics were investigated e.g., analysis of design issues of facilities in urban areas, evacuation planning, computer animation and computer vision [1]. Independently of the investigated issue the central concern is how accurate and realistic the modeling of pedestrian dynamics is.

The first part of the presentation gives a brief overview of different experiments performed under laboratory conditions and measurement methods providing results on an individual scale.

In the second part the goodness of force-based models of pedestrian dynamics is discussed. Having the quantitative validation of mathematical models in focus principle questions will be addressed throughout the presentation: Is it manageable to describe pedestrian dynamics solely with the equations of motion derived from the Newtonian dynamics? Another important issue is the geometrical representation of modeled pedestrians. Does the geometrical shape of a two dimensional projection of the human body matter when modeling pedestrian movement? If yes which form is most suitable? This point is investigated in the third part while introducing the Generalized Centrifugal Force Model (GCFM) [2]. Moreover, we highlight a frequently underestimated aspect in force-based modeling which is to what extent the steering of pedestrians influences their dynamics?

Finally, validation and verification of the GCFM is demonstrated by means of several simulations in different geometrical scenarios.

1. Andreas Schadschneider and Armin Seyfried. Modeling pedestrian dynamics - from experiment to theory and back. In Traffic and Granular Flow '09, 2009.

2. Mohcine Chraibi, Armin Seyfried, and Andreas Schadschneider. The generalized centrifugal force model for pedestrian dynamics. Phys. Rev. E, 82:046111, 2010.

Everyone is welcome to attend the MAS seminar.

Meiji institute for Advanced Study of Mathematical Science (http://www.mims.meiji.ac.jp)

(Organizers: M. Mimura, D. Ueyama, Y. Wakano, K. Ikeda and S.Kinoshita)

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Access: 10 minutes on foot from Ikuta St. Odakyu line,
Or 10 minutes by bus No. 13「明治大学正門前」, get off at the last stop.
See http://www.meiji.ac.jp/koho/campus_guide/ for details.