

Elliptical Volume Exclusion of Pedestrian Crowd

M. Chraibi

Forschungszentrum Jülich

This paper introduces a spatially continuous force-based model for simulating pedestrian dynamics. By means of repulsive forces collision-avoidance is performed by moving pedestrians. A driving force models the intention of pedestrians to reach some destination. The main intention of the developed model is the quantitative description of pedestrian movement in several geometries. Measurements of the fundamental diagram in narrow and wide corridors are performed. The results of the proposed model show a good agreement with empirical data. Having the ambition to describe with the same set of parameters the dynamics in one and two dimensional space we extend our model by introducing an elliptical volume exclusion. Given a pedestrian i we define an ellipse with velocity-dependent major semi-axis a and minor semi-axis b . The space requirement of pedestrian i is given by a , and b reflects the swaying of pedestrians while moving. To guarantee robust numerical integration of the equation of motion and to restrict the range of the repulsive force to those between adjacent pedestrians, a two-sided Hermite-interpolation of the repulsive force is implemented.