**4.a.b Wall - person repulsion**

A pedestrian wants to keep a certain distance from the borders of the obstacles in the room, like the walls, doors and pillars.

According to the description provided in the Social Force Model, the influence of the obstacles is modeled by a monotonically decreasing potential field. Focusing on our model, we described the wall-person interaction with a force inversely proportional to the distance between them.

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It must be remarked that the wall is not a point source. To describe the effect of every obstacle in space, we discretized them into several point sources at constant distance. The total repulsion force consists in the superposition of the point source contributions.

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where, Dp-w,i denotes the distance between a person and the wall point source. According to the simulation outcomes, the value of the proportionality person-wall constant k is set to 0.0003.

The calculation of the point source contributions is numerically expensive. We exploited the fact that the wall effect is constant in time and we saved the wall impact into a file. In order to be able to save it, we discretize the Apero room into a rectangular mesh of points, at which corners the wall repulsion is calculated. The maps containing the force direction, magnitude and orientation is saved into a file, which is opened only once every simulation.

Finally, the force impact on a person is calculated as the weighted average of the forces applied to the nearest points to a person. The average is weighted on the distance of these points and the person.

We were aware that the discretization procedure introduces a physical inaccuracy. Nevertheless, the error related to the discretization of the walls and of the room becomes negligible when the distance composing the mesh is particularly accurate.

**4.a.b Table - person repulsion**

The participants to the Apero usually want to take some food before moving to a table where they can eat and chat. While they move towards the food, the tables become obstacles. Their influence on pedestrian's movement is modeled in the same way of the wall repulsive force, except that the tables are considered a point sources.

As we did for the wall repulsion force, we established a table-person constant. We tested several values for this constant and eventually we set C\_t = 0.05.

**4.a.b Path towards the objective**

We assumed that the main objective of every person consists in taking the food as fast as possible and the move to the nearest table. In order to reach these two destinations, the pedestrians try to follow the shortest path.

We modeled the pedestrian's attraction to the objective with a constant pulling force pointing towards the pedestrian's goal. If there are static obstacles like walls between a person and the objective, the pedestrian follows the shortest polygonal route.