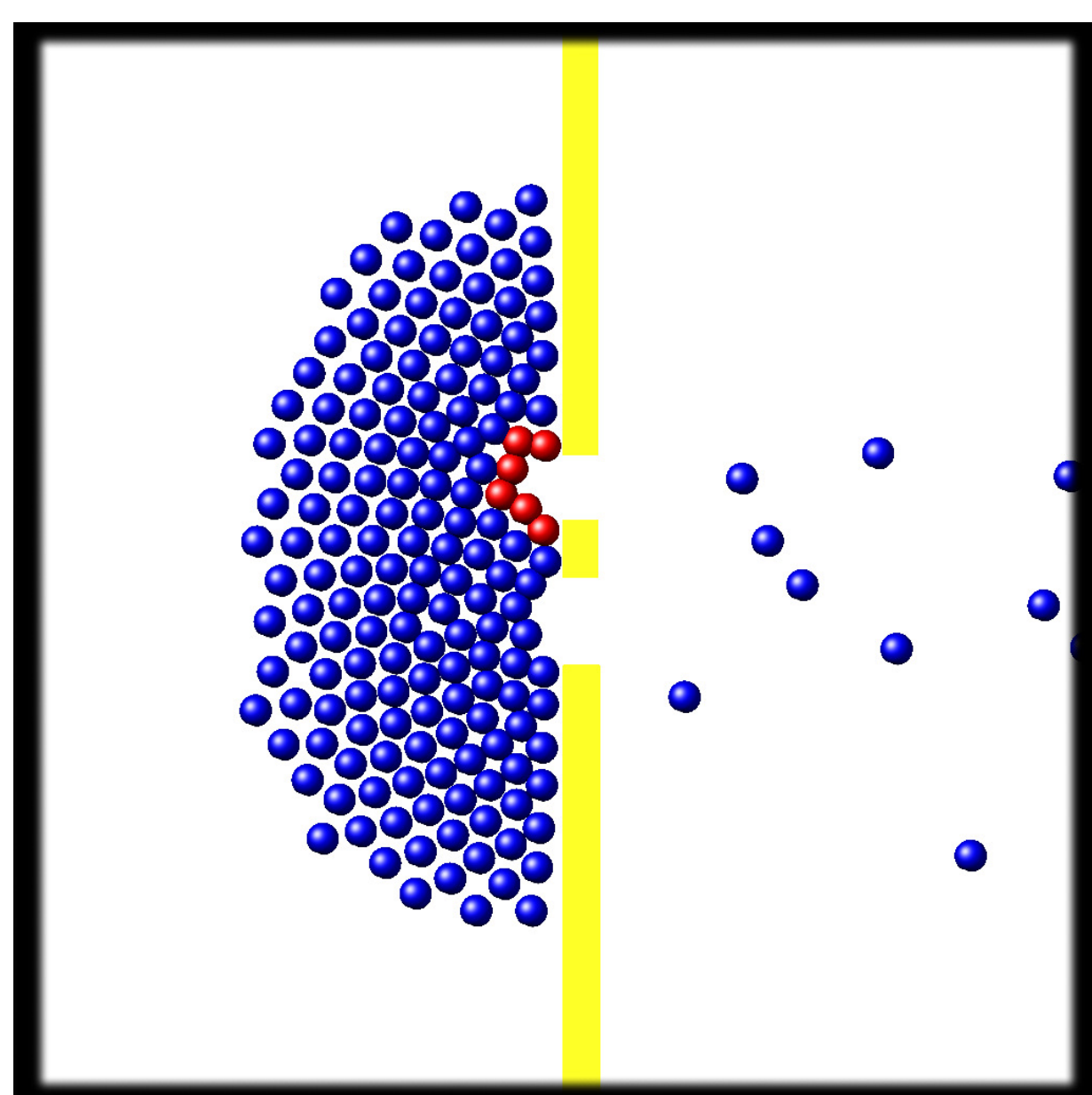


Outline

Our research examines the statistical behaviour of escaping pedestrians when two contiguous exits are available, but placed at different separation distances. We found that the evacuation time can be improved if the separation exceeds a threshold distance. This threshold distance is related to changes in the clogging dynamics close to the doors.

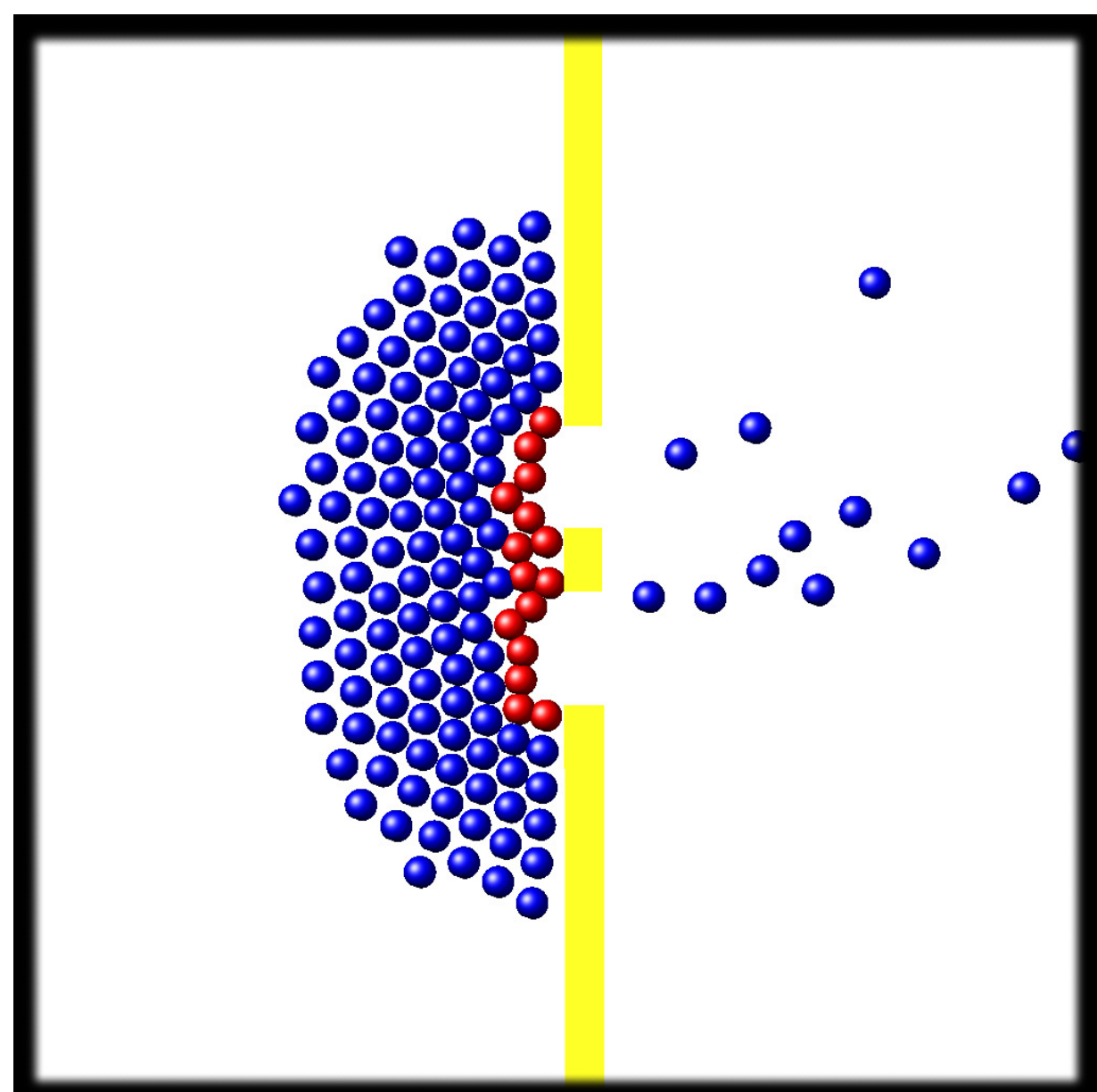
What's about



The Model (SFM):

$$m \frac{d\mathbf{v}}{dt} = \mathbf{f}_d + \mathbf{f}_s + \mathbf{f}_g$$

- \mathbf{f}_d is the desire force
- \mathbf{f}_s is the social force
- \mathbf{f}_g is the sliding friction



Individuals blocking the doors are coloured in red. The room size is $20\text{ m} \times 20\text{ m}$ (door width 1.2 m). The desired velocity is $v_d = 4\text{ m/s}$.

Evacuation time

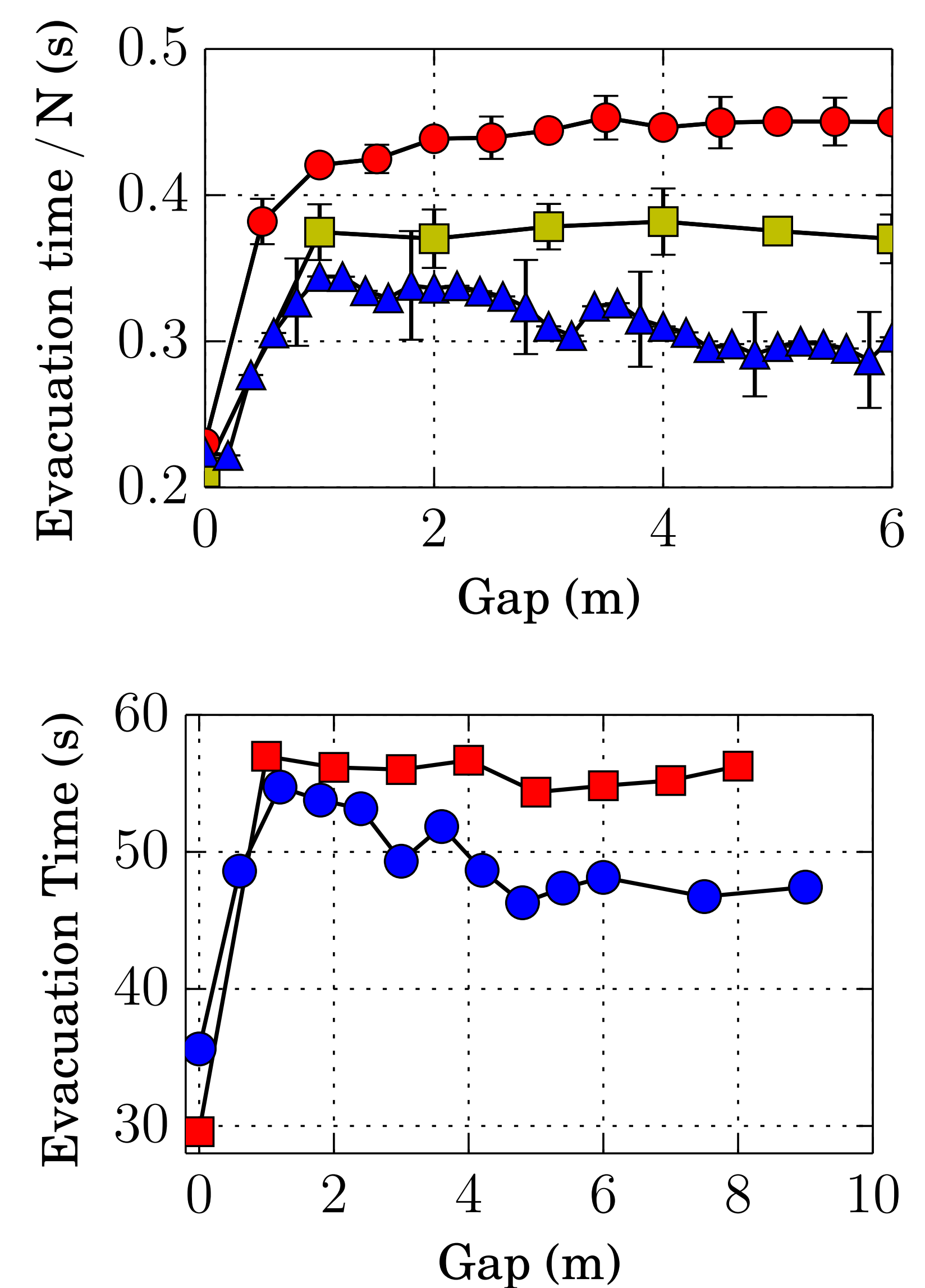


Fig 2. Mean evacuation time for 225 pedestrians computed from 30 evacuation processes. (Up) \blacktriangle corresponds to 225 individuals, rectangle \blacksquare corresponds to 584 individuals and \bullet corresponds to 960 individuals ($v_d = 4\text{ m/s}$). (Down) \bullet 225 individuals and $v_d = 4\text{ m/s}$. \blacksquare 225 individuals and $v_d = 8\text{ m/s}$.

Pressure

Separation distance of 1.5 m.

Separation distance of 5 m.

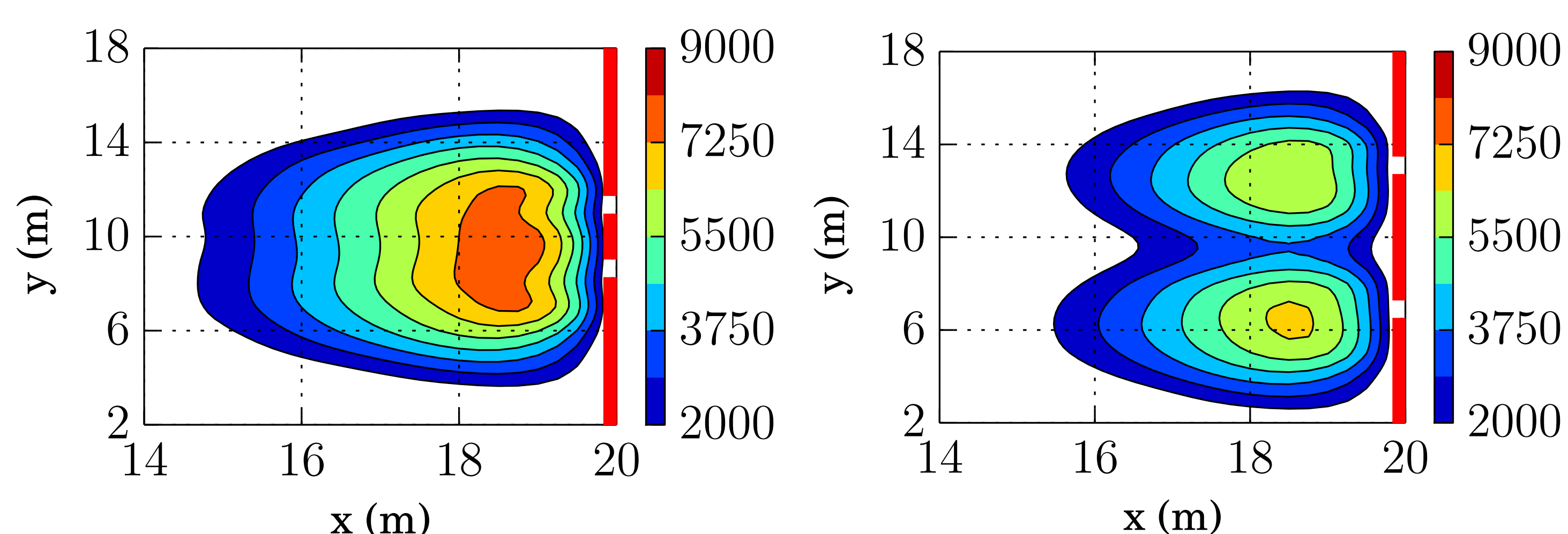


Fig 1. Mean pressures computed from 30 evacuation processes. $v_d = 4\text{ m/s}$. The scale bar on the right is expressed in N.m^{-1} units. Red bars represent the walls.

Conclusions

- ✓ Short separation distances ($\text{Gap} \simeq 1.2\text{ m}$) worsen the evacuation performance for all the explored situations, while larger distances ($\text{Gap} > 1.2\text{ m}$) enhances the evacuation time for relatively small crowds and moderate anxiety levels.
- ✓ As the separation distance approaches 1.2 m (from the null distance), the probability of having blocking structures around each door raises, resembling the situation of two independent doors.
- ✓ Increasing the crowd size (N) or the pedestrian's anxiety level (v_d) slows down the evacuation. Both magnitudes raise the pressure acting on the pedestrians.

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