

# Crowd dynamics on a lively bridge

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**Several modern footbridges around the world have experienced large lateral vibrations during crowd loading events. The onset of large-amplitude bridge wobbling has generally been attributed to crowd synchrony; although, its role in the initiation of wobbling has been challenged. In this talk, we will introduce biomechanically-inspired models of human locomotion and use them (i) to study the contribution of a single pedestrian into overall, possibly bistable, crowd dynamics [1] and (ii) to investigate to what degree pedestrian synchrony must be present for a bridge to wobble significantly and what is a critical crowd size [2]. The pedestrian models can be used as “crash test dummies” when numerically probing a specific bridge design. This is particularly important because the U.S. code for designing pedestrian bridges does not contain explicit guidelines that account for the collective pedestrian behavior.**

## REFERENCES

- [1] Belykh I, Jeter R, Belykh V (2016) Bistable gaits and wobbling induced by pedestrian-bridge interactions. *Chaos* **26**, 116314.
- [2] Belykh I, Jeter R, Belykh V (2017) Foot force models of crowd dynamics on a wobbly bridge. *Science Adv.* **3**, e1701512

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