

## ***Interactive comment on “Hydrodynamics of pedestrians’ instability in floodwaters” by Chiara Arrighi et al.***

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First of all I would like to congratulate the authors because of the great work carried out. I think that the uses of 3D simulations can help us a lot to figure out many problems, specifically those related to flood risk management as you well describe within this manuscript. I have had the chance to read the entire document deeply and I have some doubts and suggestions that I would like to share with you.

- A comprehensive and recent work that you passed over is “Experimental study of the stability of pedestrians exposed to urban pluvial flooding” by Martínez-Gomariz et al. (2016). In fact, all these “non-hydraulic” parameters mentioned in your manuscript were analyzed within the cited article and widely described in there. <http://link.springer.com/article/10.1007%2Fs11069-016-2242-z>

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Discussion paper



- In my opinion the length of the foot as a lever arm ( $d$ ) is an assumption that depends too much of the flow orientation. According to the derivation of the dimensionless mobility parameter for toppling instability, the length of the foot is even conservative when a right-to-left flow is considered. Therefore, a much lower “ $d$ ” value would affect for left-to-right flow. In fact, your parameter derivation is based on a right-to-left while the simulations were carried out by considering the opposite orientation. Maybe some explanations regarding this matter should be offered or any sensitivity analysis of flow orientation effect should be conducted.

- In my experience, results of forces obtained through 3D simulations are quite sensitive not just to the size cell but as well to the turbulence model choice. In that sense, either a non-adoption turbulence model or a “laminar” consideration sounds a bit weird to me. In my opinion, at least one of the simulations should be undertaken with any turbulence model and compare the results against the “laminar” results.

- Line 31pg12: Unfortunately, no human subjects have been tested so far for highly super-critical flows so a direct comparison between human subjects and human models is not possible for those regimens → I refer in that sense as well to Martínez-Gomariz et al. (2016) work.

- Line 20 and line 24 of pg 15. You are referring to both needs: more experiments and the role of friction coefficient understanding. In that sense I refer to Martínez-Gomariz et al. (2016) work again. Actually, after some investigation in this field I could figure out that the friction coefficient between the shoe sole and the terrain depends not just on the materials of both but as well on the position of the human body during the walking process. There are, in fact, many studies which analyze people’s falls and a good reference could be: Haslam, R., Stubbs, D. (2006). Understanding and preventing falls. CRC. London, New York. For sure these works are not related to people walking through water flows but those fit conceptually perfectly.

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