

Abstract Submitted
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Building water bridges in air: Can Taylor and Melcher's leaky dielectric model explain such a striking phenomenon? ÁLVARO G. MARÍN, DETLEF LOHSE, Physics of Fluids, University of Twente — A liquid bridge forms when applying a high voltage between two glass beakers full of water. Surprisingly, the water bridge defies gravity even when the beakers are separated at distances of around 2cm. Experimental measurements have been done to characterize its shape and correlations have been found with the electrical current passing through the bridge. A complicated flow pattern within the bridge has been also visualized using high speed recordings and particle velocimetry measurements will show its origin. Although the presented results are preliminary, some mechanisms are proposed and discussed for the stability of the bridge and the source of the flow, revealing an important role of polarization forces on the stability of the water bridge. The system would therefore behave as an extreme example of a *leaky dielectric* which would permit to make use of the famous model developed by Taylor and Melcher.¹

¹J. R. Melcher and G. I. Taylor, *Electrohydrodynamics: A review of the role of interfacial shear stresses*, Annual Review of Fluid Mechanics, vol. 1, 111-146 (1969).

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