

## Faculty - Ruben Juanes

### Faculty

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### Ruben Juanes

Associate Professor

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### Education

- Ingeniero de Caminos 1997, University of La Coruna, Spain
- MS 1999, UC Berkeley
- PhD 2003, UC Berkeley

### Research Interests

I am a computational geoscientist and engineer, with a strong interest in the physics of multiphase flow in porous media. My research focuses on advancing our fundamental understanding and predictive capabilities of the simultaneous flow of two or more fluids through rocks, soils and other porous materials. Research in my group combines theory, simulation and experiments that elucidate fundamental aspects of multi-fluid flow, which we then apply for prediction of large-scale Earth science problems in the areas of energy and the environment, including geological carbon sequestration, methane hydrates, and ecohydrology of arid environments.

### Teaching Interests

- 1.035 - Structural and Soil Mechanics
- 1.72 - Groundwater Hydrology
- 1.723 - Computational Methods for Flow in Porous Media
- 1.724s - Carbon Capture and Storage: Science, Technology and Policy

### Awards and Honors

- 2012 - Department of Energy Award for Outstanding Contributions in Geoscience
- 2010 - Department of Energy Early Career Award
- 2010 - Plenary speaker, Gordon Research Conference on Natural Gas Hydrates
- 2008 - ARCO Professorship in Energy Studies
- 2007 - Gilbert W. Winslow Career Development Professorship
- 2006 - Plenary speaker, Gordon Research Conference on Flow and

- 2006 - Invited participant, National Academy of Engineering "Frontiers of Engineering Symposium"

### Selected Publications

1. L. Cueto-Felgueroso and R. Juanes. Forecasting long-term gas production from shale. *Proceedings of the National Academy of Sciences of the U.S.A.*, 110(49), 19660-19661 (2013).
2. B. Jha, L. Cueto-Felgueroso and R. Juanes. Synergetic fluid mixing from viscous fingering and alternating injection. *Physical Review Letters*, 111, 144501 (2013).
3. J. J. Hidalgo, J. Fe, L. Cueto-Felgueroso and R. Juanes. Scaling of convective mixing in porous media. *Physical Review Letters*, 109, 264503 (2012).
4. C. Nicolaides, L. Cueto-Felgueroso, M. C. González and R. Juanes. A metric of influential spreading during contagion dynamics through the air transportation network. *PLoS ONE*, 7 (7), e40961 (2012).
5. R. Holtzman, M. L. Szulczewski, and R. Juanes. Capillary fracturing in granular media. *Physical Review Letters*, 108, 264504 (2012).
6. M. L. Szulczewski, C. W. MacMinn, H. J. Herzog, and R. Juanes. Lifetime of carbon capture and storage as a climate-change mitigation technology. *Proceedings of the National Academy of Sciences of the U.S.A.*, 109(14), 5185-5189 (2012).
7. L. Cueto-Felgueroso and R. Juanes. Macroscopic phase-field modeling of partial wetting: bubbles in a capillary tube. *Physical Review Letters*, 108, 144502 (2012).
8. P. K. Kang, M. Dentz, T. Le Borgne and R. Juanes. Spatial Markov model of anomalous transport through random lattice networks. *Physical Review Letters*, 107, 180602 (2011).
9. B. Jha, L. Cueto-Felgueroso, and R. Juanes. Fluid mixing from viscous fingering. *Physical Review Letters*, 106, 194502 (2011).
10. B. P. Scandella, C. Varadharajan, H. F. Hemond, C. Ruppel, and R. Juanes. A conduit dilation model of methane venting from lake sediments. *Geophysical Research Letters*, 38, L06408 (2011).
11. C. W. MacMinn, M. L. Szulczewski, and R. Juanes. CO<sub>2</sub> migration in saline aquifers. Part 2. Combined capillary and solubility trapping. *Journal of Fluid Mechanics*, 688:321-351 (2011).
12. C. W. MacMinn, M. L. Szulczewski, and R. Juanes. CO<sub>2</sub> migration in saline aquifers. Part 1. Capillary trapping under slope and groundwater flow. *Journal of Fluid Mechanics*, 662:329-351 (2010).
13. R. Juanes, C. W. MacMinn, and M. L. Szulczewski. The footprint of the CO<sub>2</sub> plume during carbon dioxide storage in saline aquifers: storage efficiency for capillary trapping at the basin scale. *Transport in Porous Media*, 82(1):19-30 (2010).
14. A. K. Jain and R. Juanes. Preferential mode of gas invasion in sediments: grain-scale mechanistic model of coupled multiphase fluid flow and sediment mechanics. *Journal of Geophysical Research*, 114, B08101 (2009).
15. L. Cueto-Felgueroso and R. Juanes. A phase-field model of unsaturated flow. *Water Resources Research*, 45, W10409 (2009).
16. L. Cueto-Felgueroso and R. Juanes. Nonlocal interface dynamics and pattern formation in gravity-driven unsaturated flow through porous media. *Physical Review Letters*, 101, 244504 (2008).
17. R. Juanes, E. J. Spiteri, F. M. Orr, Jr., and M. J. Blunt. Impact of relative permeability hysteresis on geological CO<sub>2</sub> storage. *Water*



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