

# Curriculum Vitae

**Name:** Vakhtang Putkaradze

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## Education

- 1997 PhD, Physics University of Copenhagen (Denmark)  
Scientific Advisor: Prof. T. Bohr.  
1993 M.Sc., Applied Mathematics Moscow Physico-Technical Institute (Russia)

## Postdoctoral positions

- Aug. 1998–Aug. 1999 L. E. Dickson instructor, Mathematics, University of Chicago  
Advisors: Profs. P. Constantin and L. Kadanoff  
Aug. 1997– Aug.1998 Postdoctoral Research Associate, University of Chicago  
Advisors: Profs. P. Constantin and L. Kadanoff

## Academic positions

- July 2012 – current Centennial Professor (tenured), Mathematics,  
University of Alberta  
Aug 2010–June 2012 Professor of Biomedical Engineering,  
Colorado State University  
Aug 2010–June 2012 Full Professor (tenured), Mathematics,  
Colorado State University  
Aug. 2005–Aug 2010 Associate Professor (tenured), Mathematics,  
Colorado State University  
July 2004–Aug. 2005 Associate Professor (tenured), Mathematics,  
University of New Mexico  
Aug. 1999–Aug.2004 Assistant Professor, Mathematics,  
University of New Mexico

## Other positions

- 2007-2012 Adjunct faculty, Mechanical engineering,  
University of New Mexico  
2002 Visiting Professor  
University of Aix-Marseille

## Honors and Awards

- |      |                      |   |         |
|------|----------------------|---|---------|
| 2012 | Centennial Professor | University of Alberta                       | Canada  |
| 2006 | Humboldt Fellowship  | Humboldt Foundation                         | Germany |
| 2003 | NSF/JSPS             | Japan Society for the Promotion of Sciences | Japan   |

## Recent research interests

- Geometric and variational methods in continuous media: fluid, elastica and fluid-structure interactions
- Holonomic and non-holonomic constraints
- Geometric description of self-assembly for oriented nano-particles
- Sensor applications based on mechanical resonators
- Renewable energy: energy harvesting and solar

## Graduate students supervised, last five years

1. **current:** Mitchell Canham, MSc 2015 (expected), PhD 2017 (expected)
2. **current:** Stuart Rogers, PhD 2016 (expected)
3. Michael Chi, MSc Summer 2014 (completed)
4. Daniel Brake, MSc 2008, PhD Fall 2012, now postdoc at Notre Dame
5. Melody Dodd, MSc Spring 2012, now PhD student at the Colorado State University
6. Steve Benoit, PhD Spring 2011, now Research faculty, Colorado State University
7. Byongsoo Kim, MSc 2008, PhD Fall 2010, private employment, South Korea

## Current Research Support

1. University of Alberta Centennial Fund, \$100,000, 2012-2017 (current)
2. Natural Sciences and Engineering Research Council (NSERC) Discovery grant, PI, 2013-2018 \$115,000 (current)

## List of Refereed Publications

1. P. Kevrikidis, V. Putkaradze and Z. Rapti, *Non-holonomic constraints and their impact on discretizations of Klein-Gordon lattice dynamical models*, Proceedings of AIMS, to appear (Accepted February 2015).
2. F. Gay-Balmaz, V. Putkaradze, *On flexible tubes conveying fluid: geometric non-linear theory, stability and dynamics*, J. Nonlinear Science, to appear (Accepted February 2015).
3. F. Gay-Balmaz, V. Putkaradze, *Dynamics of elastic strands with rolling contact*, Physica D, **294**, 6-23 (2015).
4. M. Chi, F. Gay-Balmaz, V. Putkaradze and P. Vorobieff, *Dynamics and control of flexible solar updraft towers*, Proc. Roy. Soc A, **471**, 20140539 (2014).

5. M. Kubota, V. Putkaradze and T. Hikihara, *Energy absorption at synchronization in phase between coupled Duffing systems*, Intl. J. Dynamics and Control, 2195-268X (2014).
6. N.C. Monserud, E.B. Malm, P. W. Wachulak, V. Putkaradze, G. Balakrishnan, W. Chao, E. Anderson, D. Carlton, and M. C. Marconi, *Recording oscillations of sub-micron size cantilevers by extreme ultraviolet Fourier transform holography*, Optics Express, **22**, pp. 4161-4167 (2014).  
Reprinted in *Virtual Journal for Biomedical Optics (VJBO)*.
7. F. Gay-Balmaz and V. Putkaradze, *Exact geometric theory for flexible, fluid-conducting tubes*, Comptes Rendus Mécanique, **342**, pp. 79-84 (2014).
8. V. Putkaradze, P. Vorobieff, A. Mammoli and N. Fahti, *Inflatable Free-Standing Solar Towers*, Solar Energy **98**, pp. 85-98 (2013).
9. D. D. Holm, V. Putkaradze and C. Tronci, *Collisionless kinetic theory of rolling molecules*, Kinetic and related models, **6**, pp. 429-458 (2013).
10. F. Gay-Balmaz and V. Putkaradze, *Dynamics of Elastic Rods in Perfect Friction Contact*, Phys. Rev. Lett. **109**, 244303 (2012).
11. D. Brake, H. Xu, A. Hollowell, G. Balakrishnan, C. Hains, E. Malm, M. Marconi and V. Putkaradze, *Intrinsic localized modes in two-dimensional vibrations of crystalline pillars and their application for sensing*, J. Appl. Physics, **112** 104326 (2012).
12. D. D. Holm, F. Gay-Balmaz, V. Putkaradze and T. S. Ratiu (2012), *Exact geometric theory of dendronized polymer dynamics*, *Advances in Applied Math.*, **48**, pp. 535-574. ArXiv: 1005.2701. Selected as *Top 25 hottest articles, Jan-March 2012*.
13. S. Benoit, D. D. Holm and V. Putkaradze (2011), *Helical states of nonlocally interacting molecules and their linear stability: geometric approach*, J. Phys. A: Math Theor. **44**, 055201 (IOP select article).
14. B. Kim and V. Putkaradze (2010), *Ordered and disordered dynamics in monolayers of rolling particles*, Phys. Rev. Lett. **105**, 244302.
15. D.C.P.Ellis, F. Gay-Balmaz, D. D. Holm, V. Putkaradze and T. S. Ratiu (2010) *Symmetry reduced dynamics of charged molecular strands*, Arch. Ratl. Mech. Anal, **197** pp. 811-902.
16. D. D. Holm, V. Putkaradze and C. Tronci (2010) *Double-bracket dissipation in kinetic theory for particles with anisotropic interactions*, Proc. Roy. Soc. A, online DOI: 10.1098/rspa.2010.0043.
17. S. Ponomarev, V. Putkaradze and T. Bishop (2009), *Relaxation Dynamics of Nucleosomal DNA*, Physical Chemistry Chemical Physics, **11**, pp. 10633-10643.
18. B. Kim, V. Putkaradze and T. Hikihara, (2009) *Manipulation of single atoms by atomic force microscopy as a resonance effect*, Phys. Rev. Lett. **102**, 215502 [4].
19. D. D. Holm and V. Putkaradze, (2009) *Nonlocal orientation-dependent dynamics of molecular strands*, C. R. Acad Sci. Paris, **347**, pp. 1093-1098 ArXiv:0803.1702.
20. B. Birnir, K. Mertens, V. Putkaradze and P. Vorobieff, (2008) *Meandering of streams on hydrophobic surfaces as a noise-driven effect*, Phys. Rev. Lett, **101**, 114501.
21. D. D. Holm, V. Putkaradze and C. Tronci, (2008) *Geometric gradient-flow dynamics with singular solutions*, Physica D, **237** (22), pp. 2952-2965; arXiv:0704.2369.

22. B. Birnir, K. Mertens, V. Putkaradze and P. Vorobieff (2008), *Morphology of a stream on a hydrophobic surface. Part II: Meandering.*, J. Fluid Mech, **607**, pp. 401-417.
23. D. D. Holm, V. Putkaradze and C. Tronci, (2008) *Kinetic models of heterogeneous dissipation*, J. Phys. A: Math. Theor. **41**, 344010; arXiv:0712.0397.
24. D. D. Holm, V. Putkaradze and C. Tronci, (2007) *Geometric dissipation in kinetic equations*, C. R. Acad. Sci. Paris , **345**, pp. 297-302; arXiv:0705.0765.
25. D. D. Holm, V. Putkaradze, (2007), *Formation and Evolution of Singularities in Anisotropic Geometric Continua* Physica D, **235**, pp.33-47, arXiv:nlin/0608054.
26. S. Watanabe and V. Putkaradze. *A simple model for description of flows in symmetric channel expansions*, Phys. Lett A, **370**, pp.58-63.
27. V. Putkaradze and P. Vorobieff (2006), *Bifurcation, hysteresis and multiple solutions in expanding channel flows*, Phys. Rev. Lett, **97**, 144502.
28. M. Nitsche, D. D. Holm and V. Putkaradze (2006), *Euler-alpha and vortex blob regularization of vortex filament and vortex sheet motion*, J. Fluid Mech., **555**, 149-176.
29. D. D. Holm and V. Putkaradze (2006), *Formation of clumps and patches in self-aggregation of finite size particles*, Physica D, **220** (2), 183-196. ArXiv: nlin.PS/050620.
30. K. Mertens, V. Putkaradze, D. Xia and S. Brueck (2005), *Theory and Experiment for Directed Self-Assembly of Nano-Particles*, J. Applied Physics, **98**, 094309.
31. D D. Holm and V. Putkaradze (2005), *Aggregation of finite sized particles with variable mobility* , Physical Review Letters, **95**, 225105.  
Selected for the December 1, 2005 issue of Virtual Journal of Biological Physics Research at [www.vjbio.org](http://www.vjbio.org). Reprinted yet again in the December 5, 2005 issue of Virtual Journal of Nanoscale Science & Technology at [www.vjnano.org](http://www.vjnano.org).
32. K. Mertens, V. Putkaradze and P. Vorobieff (2005), *Morphology of a stream flowing down an inclined plane. Part 1: Braiding*, J. Fluid Mechanics, **531**, pp. 49-58.
33. K. Mertens, V. Putkaradze and P. Vorobieff (2004), *Braiding Patterns on an inclined plane*, Nature, **430**, 165.
34. D D Holm, V Putkaradze and S Stechmann (2004), *Rotating Cocentric Circular Peakons*, Nonlinearity, **17**, pp. 1-24.
35. D. D. Holm, V. Putkaradze, P. D. Weidman, B. Wingate (2003) *Boundary effects on exact solutions of the Lagrangian-averaged Navier-Stokes- $\alpha$  equations*, J. Stat. Phys., **113**, (5/6), pp.841-854.
36. S. Watanabe, V. Putkaradze, T. Bohr (2003), *Integral Methods for Shallow Free Surface Flows with Separation*, J. Fluid Mech, **480**, pp. 233-265.
37. P. Weidman, V. Putkaradze (2003), *Axisymmetric stagnation flow obliquely impinging on a circular cylinder*, Eur. J. of Mech B, **22**, pp. 123-131 (2003).
38. V. Putkaradze and P. Weidman (2003) *Turbulent wake solutions for the Prandtl- $\alpha$  equations* , Physical Review E, **67**, 036304.
39. V. Putkaradze (2003) *Radial Flow of Two Immiscible Fluids: Analytical Solutions and Bifurcations*, J. Fluid Mech, **477**, pp. 635-648.

40. H. Fogedby and V. Putkaradze (2002) *Power Laws and Stretched Exponentials in a Noisy Finite-time Singularity model*, Physical Review E, **66** 021103.
41. P. Constantin, C. Hallstrom, V. Putkaradze (2001) *Logarithmic Bounds for Infinite Prandtl Number Rotating Convection*, J. Math. Phys, **42**, pp. 773-790.
42. V. Putkaradze, P. Dimon (2000) *Non-uniform two-dimensional flow from a point source*, Phys. Fluids, **12**, pp. 66-70.
43. P. Constantin, C. Hallstrom, V. Putkaradze (1999) *Heat transport in rotating convection* Physica D **125** 3-4 pp. 275-284.
44. T. Bohr, C. Ellegaard, A. E. Hansen, K. Hansen, A. Haaning, V. Putkaradze, S. Watanabe (1998) *Separation and pattern formation in hydraulic jumps*, Physica A, **249**, 111-119.
45. F. Christiansen, P. Cvitanović and V. Putkaradze,(1997) *Spatiotemporal Chaos in terms of unstable recurrent patterns*, Nonlinearity **10**, pp.55-70.
46. V. Putkaradze, T. Bohr and J. Krug, (1997) *Global Estimates and Shocks for the Noiseless Conserved KPZ equation*, Nonlinearity **10**, pp. 823-847 (1997).
47. T. Bohr, V. Putkaradze, & S. Watanabe (1997) *Averaging theory for the structure of hydraulic jumps and separation in laminar free surface flows*, Phys. Rev. Lett. **79**, 6, R1038.
48. T. Bohr, P. Dimon, and V. Putkaradze (1993) *Shallow-water approach to the circular hydraulic jump*, J. Fluid Mech. **254**, pp. 635-648 (1993).