Paul B Umbanhowar

List of Publications by Year
in descending order

84 papers	3,861 citations	30 h-index	61 g-index
84 all docs	84 docs citations	84 times ranked	1985 citing authors

159585 123424

#	Article	IF	Citations
1	Localized excitations in a vertically vibrated granular layer. Nature, 1996, 382, 793-796.	27.8	717
2	Hexagons, Kinks, and Disorder in Oscillated Granular Layers. Physical Review Letters, 1995, 75, 3838-3841.	7.8	386
3	Transition to parametric wave patterns in a vertically oscillated granular layer. Physical Review Letters, 1994, 72, 172-175.	7.8	315
4	A review on locomotion robophysics: the study of movement at the intersection of robotics, soft matter and dynamical systems. Reports on Progress in Physics, 2016, 79, 110001.	20.1	197
5	Sensitive dependence of the motion of a legged robot on granular media. Proceedings of the National Academy of Sciences of the United States of America, 2009, 106, 3029-3034.	7.1	164
6	Mechanical models of sandfish locomotion reveal principles of high performance subsurface sand-swimming. Journal of the Royal Society Interface, 2011, 8, 1332-1345.	3.4	149
7	Modelling size segregation of granular materials: the roles of segregation, advection and diffusion. Journal of Fluid Mechanics, 2014, 741, 252-279.	3.4	111
8	Granular impact and the critical packing state. Physical Review E, 2010, 82, 010301.	2.1	108
9	Force and Flow Transition in Plowed Granular Media. Physical Review Letters, 2010, 105, 128301.	7.8	103
10	Dynamic In-Hand Sliding Manipulation. IEEE Transactions on Robotics, 2017, 33, 778-795.	10.3	76
11	Undulatory swimming in sand: experimental and simulation studies of a robotic sandfish. International Journal of Robotics Research, 2011, 30, 793-805.	8.5	72
12	Granular segregation in circular tumblers: theoretical model and scaling laws. Journal of Fluid Mechanics, 2015, 765, 632-652.	3.4	68
13	Periodic, aperiodic, and transient patterns in vibrated granular layers. Physica A: Statistical Mechanics and Its Applications, 1998, 249, 1-9.	2.6	61
14	Friction-Induced Velocity Fields for Point Parts Sliding on a Rigid Oscillated Plate. International Journal of Robotics Research, 2009, 28, 1020-1039.	8.5	61
15	Stratification, segregation, and mixing of granular materials in quasi-two-dimensional bounded heaps. Physical Review E, 2012, 86, 051305.	2.1	57
16	Modeling segregation of bidisperse granular materials using physical control parameters in the quasiâ€2D bounded heap. AIChE Journal, 2015, 61, 1524-1534.	3.6	56
17	Modeling Segregation in Granular Flows. Annual Review of Chemical and Biomolecular Engineering, 2019, 10, 129-153.	6.8	56
18	Modelling density segregation in flowing bidisperse granular materials. Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences, 2016, 472, 20150856.	2.1	49

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19	Discrete element simulation of cylindrical particles using super-ellipsoids. Particuology, 2019, 46, 55-66.	3.6	49
20	Kinematics of monodisperse and bidisperse granular flows in quasi-two-dimensional bounded heaps. Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences, 2013, 469, 20130235.	2.1	45
21	Shear-Rate-Independent Diffusion in Granular Flows. Physical Review Letters, 2015, 115, 088001.	7.8	45
22	A continuum approach for predicting segregation in flowing polydisperse granularÂmaterials. Journal of Fluid Mechanics, 2016, 797, 95-109.	3.4	45
23	Wavelength scaling and square/stripe and grain mobility transitions in vertically oscillated granular layers. Physica A: Statistical Mechanics and Its Applications, 2000, 288, 344-362.	2.6	40
24	Diffusion, mixing, and segregation in confined granular flows. AICHE Journal, 2019, 65, 875-881.	3.6	36
25	Asymmetric concentration dependence of segregation fluxes in granular flows. Physical Review Fluids, 2018, 3, .	2.5	35
26	Force and flow at the onset of drag in plowed granular media. Physical Review E, 2014, 89, 042202.	2.1	34
27	Continuum modeling of granular segregation during hopper discharge. Chemical Engineering Science, 2019, 193, 188-204.	3.8	34
28	Sliding manipulation of rigid bodies on a controlled 6-DoF plate. International Journal of Robotics Research, 2012, 31, 819-838.	8.5	33
29	Simulation and modeling of segregating rods in quasiâ€2D bounded heap flow. AICHE Journal, 2018, 64, 1550-1563.	3.6	32
30	Effect of pressure on segregation in granular shear flows. Physical Review E, 2018, 97, 062906.	2.1	31
31	Creeping motion in granular flow. Physical Review E, 2005, 71, 031304.	2.1	30
32	Rising and sinking intruders in dense granular flows. Physical Review Research, 2020, 2, .	3.6	29
33	Effects of worker size on the dynamics of fire ant tunnel construction. Journal of the Royal Society Interface, 2012, 9, 3312-3322.	3.4	26
34	Optimal Vibratory Stick-Slip Transport. IEEE Transactions on Automation Science and Engineering, 2008, 5, 537-544.	5.2	25
35	Friction-Induced Lines of Attraction and Repulsion for Parts Sliding on an Oscillated Plate. IEEE Transactions on Automation Science and Engineering, 2009, 6, 685-699.	5.2	24
36	Granular lift forces predict vertical motion of a sand-swimming robot. , 2011, , .		21

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37	Vibration-Induced Frictional Force Fields on a Rigid Plate. Proceedings - IEEE International Conference on Robotics and Automation, 2007, , .	0.0	20
38	A mapping method for distributive mixing with diffusion: Interplay between chaos and diffusion in time-periodic sine flow. Physics of Fluids, 2013, 25, .	4.0	20
39	Comment on â€œSpontaneous Wave Pattern Formation in Vibrated Granular Materialsâ€. Physical Review Letters, 1997, 79, 4713-4713.	7.8	19
40	The effect of anisotropic friction on vibratory velocity fields. , 2012, , .		18
41	Slow axial drift in three-dimensional granular tumbler flow. Physical Review E, 2013, 88, 012208.	2.1	17
42	Modeling, design, and control of 6-DoF flexure-based parallel mechanisms for vibratory manipulation. Mechanism and Machine Theory, 2013, 64, 111-130.	4.5	16
43	Mixing with piecewise isometries on a hemispherical shell. Chaos, 2016, 26, 073115.	2.5	16
44	Controlling granular segregation using modulated flow. Powder Technology, 2017, 312, 360-368.	4.2	16
45	Continuum modelling of segregating tridisperse granular chute flow. Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences, 2018, 474, 20170384.	2.1	15
46	Modeling segregation of polydisperse granular materials in developing and transient freeâ€surface flows. AIChE Journal, 2019, 65, 882-893.	3.6	15
47	A unified description of gravity- and kinematics-induced segregation forces in dense granular flows. Journal of Fluid Mechanics, 2021, 925, .	3.4	15
48	Patterns in the sand. Nature, 1997, 389, 541-542.	27.8	14
49	Modelling segregation of bidisperse granular mixtures varying simultaneously in size and density for free surface flows. Journal of Fluid Mechanics, 2021, 918, .	3.4	14
50	Segregation models for density-bidisperse granular flows. Physical Review Fluids, 2020, 5, .	2.5	14
51	Axisymmetric granular flow on a bounded conical heap: Kinematics and size segregation. Chemical Engineering Science, 2020, 217, 115505.	3.8	13
52	Toward the set of frictional velocity fields generable by 6-degree-of-freedom oscillatory motion of a rigid plate. , 2010, , .		12
53	Remarkable simplicity in the prediction of nonspherical particle segregation. Physical Review Research, 2020, 2, .	3.6	11
54	Cutting and Shuffling of a Line Segment: Effect of Variation in Cut Location. International Journal of Bifurcation and Chaos in Applied Sciences and Engineering, 2016, 26, 1630038.	1.7	10

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55	Predicting mixing via resonances: Application to spherical piecewise isometries. Physical Review E, 2017, 95, 062210.	2.1	10
56	The Soft-Landing Problem: Minimizing Energy Loss by a Legged Robot Impacting Yielding Terrain. IEEE Robotics and Automation Letters, 2020, 5, 3658-3665.	5.1	10
57	On Mixing and Segregation: From Fluids and Maps to Granular Solids and Advectionâ€"Diffusion Systems. Industrial & Engineering Chemistry Research, 2015, 54, 10465-10471.	3.7	9
58	Mixing and transport from combined stretching-and-folding and cutting-and-shuffling. Physical Review E, 2017, 96, 042213.	2.1	9
59	Mixing and the fractal geometry of piecewise isometries. Physical Review E, 2017, 95, 042208.	2.1	9
60	Granular flow in a wedgeâ€shaped heap: Velocity field, kinematic scalings, and segregation. AIChE Journal, 2020, 66, e16912.	3.6	9
61	Modeling segregation of polydisperse granular materials in hopper discharge. Powder Technology, 2020, 374, 389-398.	4.2	9
62	Modeling granular segregation for overlapping species distributions. Chemical Engineering Science, 2021, 231, 116259.	3.8	9
63	Competitive autocatalytic reactions in chaotic flows with diffusion: Prediction using finite-time Lyapunov exponents. Chaos, 2014, 24, 013109.	2.5	8
64	Unsteady flows and inhomogeneous packing in damp granular heap flows. Physical Review E, 2018, 98, .	2.1	8
65	Persistent structures in a three-dimensional dynamical system with flowing and non-flowing regions. Nature Communications, 2018, 9, 3122.	12.8	8
66	Low density fragile states in cohesive powders. American Journal of Physics, 2006, 74, 720-721.	0.7	7
67	Visiflex: A Low-Cost Compliant Tactile Fingertip for Force, Torque, and Contact Sensing. IEEE Robotics and Automation Letters, 2021, 6, 3009-3016.	5.1	6
68	Predicting segregation of nonspherical particles. Physical Review Fluids, 2021, 6, .	2.5	6
69	Transient response in granular quasi-two-dimensional bounded heap flow. Physical Review E, 2017, 96, 040902.	2.1	5
70	Modeling Segregation in Modulated Granular Flow. EPJ Web of Conferences, 2017, 140, 03018.	0.3	5
71	Shaken sand â€" a granular fluid?. Nature, 2003, 424, 886-887.	27.8	4
72	Modeling granular materials: A test bed for framing and analysis. AIChE Journal, 2013, 59, 3237-3246.	3.6	4

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73	Cutting and shuffling a hemisphere: Nonorthogonal axes. Physical Review E, 2019, 99, 032204.	2.1	4
74	Pattern formation in a fully three-dimensional segregating granular flow. Physical Review E, 2019, 99, 062905.	2.1	4
75	The geometry of cutting and shuffling: An outline of possibilities for piecewise isometries. Physics Reports, 2019, 802, 1-22.	25.6	4
76	Measuring segregation characteristics of industrially relevant granular mixtures: Part II â€“ Experimental application and validation. Powder Technology, 2020, 368, 278-285.	4.2	4
77	Segregation forces in dense granular flows: closing the gap between single intruders and mixtures. Journal of Fluid Mechanics, 2022, 935, .	3.4	4
78	Optimized Mixing by Cutting-and-Shuffling. SIAM Journal on Applied Dynamical Systems, 2018, 17, 2544-2573.	1.6	3
79	Measuring segregation characteristics of industrially relevant granular mixtures: Part I â€“ A continuum model approach. Powder Technology, 2020, 368, 190-201.	4.2	3
80	Identifying invariant ergodic subsets and barriers to mixing by cutting and shuffling: Study in a birotated hemisphere. Physical Review E, 2020, 101, 012204.	2.1	2
81	Granular segregation induced by a moving subsurface blade. Physical Review E, 2019, 100, 052902.	2.1	1
82	Exploring shear-induced segregation in controlled-velocity granular flows. EPJ Web of Conferences, 2021, 249, 03012.	0.3	1
83	Particle capture in a model chaotic flow. Physical Review E, 2021, 104, 064203.	2.1	1
84	Potentialities and limitations of machine learning to solve cut-and-shuffle mixing problems: A case study. Chemical Engineering Science, 2022, 260, 117840.	3.8	0