

RESEARCH

Recent publications

Geometric mechanics and nonlinear control

Journals

Sneha Gajbhiye and R. N. Banavar

Geometric Modeling and Local Controllability of a Spherical Robot Actuated by a Pendulum,

DOI:10.1002/RNC, International Journal of Robust and Nonlinear Control (2015).

K. S. Phogat, D. Chatterjee and R. N. Banavar

Multiple Shooting Technique for Optimal Attitude Control of a Spacecraft with Momentum and Actuator Constraints,

submitted to the International Journal of Robust and Nonlinear Control.

Conferences

Sneha Gajbhiye and R. N. Banavar

A geometric approach to tracking of a nonholonomic system

submitted to NOLCOS 2016, to be held in Monterrey Bay, USA, July 2016.

S. Kadam and R. N. Banavar

Geometric controllability of the Purcell's swimmer and its symmetrized cousin

submitted to NOLCOS 2016, to be held in Monterrey Bay, USA, July 2016.

A. Nayak and R. N. Banavar

Almost globally asymptotic tracking on Riemannian manifolds

accepted for the European Control Conference, to be held in Alborg, Denmark, July 2016.

R. Agrawal and R. N. Banavar

Circular orbit spacecraft control at the L4 point using Lyapunov functions

accepted for the European Control Conference, to be held in Alborg, Denmark, July 2016.

Older publications

Geometric mechanics and nonlinear control

Journals

S. R. Sahoo and R. N. Banavar

Attitude synchronization of satellites with internal actuation,
European Journal of Control (20), 2014 152-161. (Elsevier.)

R. Bayadi and R. N. Banavar

Almost global attitude stabilization of a rigid body for both internal and external actuation schemes,
European Journal of Control (20), 2014 45-54. (Elsevier.)

R. Bayadi, R. N. Banavar and D. E. Chang

Characterizing the Reachable Sets of a Spacecraft with Two Rotors,
Systems and Control Letters (62) 2013, 453-460.

V. Joshi , R. N. Banavar and Rohit Hippalgaonkar

Design and Analysis of a Spherical Mobile Robot,
Mechanism and Machine Theory, Elsevier, 45 (2010) 130-136

R. N. Banavar and Biswadip Dey

Stabilizing a Flexible Beam on A Cart: A Distributed Port Hamiltonian Approach,
Journal of Nonlinear Science, Springer, published online (Dec. 8th, 2009)

V. Joshi and R. N. Banavar

Motion Analysis of a Spherical Mobile Robot,
Robotica, Cambridge University Press, Vol. 27, Issue 03, pp: 343-353, May 2009
(published online June 2008)

V. Sankaranarayanan, A. D. Mahindrakar and R. N. Banavar

A Switched Controller for an Underactuated Underwater Vehicle
pg. 2266- 2278, Vol. 13 Communications in Nonlinear Science and Numerical Simulations, 2008.

Ravi N. Banavar and V. Sankaranarayanan

Switched Finite-Time Control of a Class of Underactuated Systems
Lecture Notes in Control and Information Sciences (LNCIS Series),
Springer, 2006. ([Monograph](#))

F. Kazi, R. N. Banavar, R. Ortega and N. S. Manjarekar
Minimizing Cable Swing in a Gantry Crane Using the Interconnection and
Damping Assignment-Passivity Based Control Methodology,
To appear in the International Journal of Advances in Vibration Engineering.

K. S. Phogat, D. Chatterjee and R. N. Banavar
A Geometric Approach to Single Axis Time-Optimal Attitude Manoeuvres,
Proceedings of the European Control Conference, Linz, Austria, July 2015.

M. Trivedi, R. N. Banavar and P. Kotyczka [Port-Hamiltonian Modelling for
Buckling Control of a Vertical Flexible Beam with Actuation at the Bottom](#)
Proceedings of the 5th IFAC Workshop on Lagrangian and Hamiltonian Methods
for Nonlinear Control held in Lyon ,France, July 2015.

Sneha Gajbhiye and R. N. Banavar
Local Equilibrium Controllability of a Spherical Robot Actuated by a Pendulum,
Proceedings of IEEE Conference on Decision and Control, to be held in Firenze,
Italy, Dec 2013.

Ramaprakash Bayadi and R. N. Banavar,
[Weak Positive Poisson Stability and Hamiltonian Vector fields in Mechanical
Systems](#),
Proceedings of the 4th IFAC Workshop on Lagrangian and Hamiltonian Methods
for Nonlinear Control held in Bertinoro, Italy, August 2012. ([bayadi banavar.pdf](#))

Sneha Gajbhiye and R. N. Banavar
[The Euler-Poincare Equation for a Spherical Robot Actuated by a Pendulum](#),
Proceedings of the 4th IFAC Workshop on Lagrangian and Hamiltonian Methods
for Nonlinear Control held in Bertinoro, Italy, August 2012.
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Ramaprakash Bayadi, Ravi N. Banavar and Dong Eui Chang
[Characterizing the Reachable Sets of a Spacecraft with Two Rotors](#),

Proceedings of the American Control Conference, Montreal, Canada, June 2012.

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Ramaprakash Bayadi, R. N. Banavar, Bernhard M. Maschke
Small- Time Local Controllability of the Orientation of a Spacecraft Actuated by CMGs,

Proceedings of the 18th IFAC World Congress, Milan Italy, September 2011

M. V. Trivedi, R. N. Banavar, Bernhard M. Maschke
Stabilization of Hybrid Lumped-Distributed Parameter Mechanical System with Multiple Equilibria,

Proceedings of the 18th IFAC World Congress, Milan Italy, September 2011

F. Kazi, P. Mullhaupt, R. N. Banavar and D. Bonvin
Dynamics and Control of 2D Spider Crane: a Lie-Backlund Approach,
Proceedings of the European Control Conference in Budapest Hungary, August 2009.

R. N. Banavar and Biswadip Dey
Stabilizing a Flexible Beam on A Cart: A Distributed Port Hamiltonian Approach,
Proceedings of the European Control Conference in Budapest Hungary, August 2009.

R. N. Banavar and Anup Menon
Time-Optimal Transfer in The Plate Ball Problem,
Proceedings of the European Control Conference in Budapest Hungary, August 2009

F. Kazi and R. N. Banavar
Energy Shaping Control of a Differentially Flat System,
Proceedings of the International Conference and Exhibition on Aerospace Engineering in IISc Bangalore, India in May 2009.

G. Viola, R. Ortega, R. N. Banavar, J. A. Acosta and A. Astolfi
Total Energy Shaping Control of Mechanical Systems: Simplifying the Matching Equations via Coordinate Changes,

3rd IFAC Workshop on Lagrangian and Hamiltonian Methods for Nonlinear Control, Nagoya, July 2006

Faruk Kazi, R. N. Banavar, R. Ortega and N. S. Manjarekar
The IDA-PBC Methodology Applied to a Gantry Crane
Proceedings of the Mathematical Theory of Networks and Systems, Kyoto, July 2006

V. Sankaranarayanan and R. N. Banavar
Output Feedback Stabilization of a Mobile Robot
Proceedings of the Mathematical Theory of Networks and Systems, Kyoto, July 2006

Amar Banerji, R. N. Banavar and D. Venkatesh
A Non-Dexterous Dual Arm Robot's Feasible Orientations Along
Desired Trajectories: Analysis & Synthesis
Proceedings of the IEEE Conference on Decision and Control, Seville, December 2005

Power systems applications

[Journals](#)

N S Manjarekar and R N Banavar
[Nonlinear Control Synthesis for Electrical Power Systems using Controllable Series Capacitors](#)
Springer Briefs in Applied Sciences and Technology, Vol 11, 2012 ([Monograph](#))

N. S. Manjarekar, R. N. Banavar and R. Ortega
[Stabilization of a Synchronous Generator with a Controllable series capacitor via Immersion and Invariance,](#)
International Journal of Robust and Nonlinear Control, doi: 10.1002/rnc.1732 (2011).

N. S. Manjarekar, R. N. Banavar and R. Ortega
[An Immersion and Invariance Algorithm for a Differential Algebraic System,](#)
European Journal of Control, Issue No.2, 2012.

N. S. Manjarekar, R. N. Banavar and R. Ortega
Application of Interconnection and Damping Assignment to the Stabilization of a Synchronous Generator with a Controllable Series Capacitor,
International Journal of Electrical Power and Energy Systems, Elsevier, 32
(2010) 63-70.

Conferences

N. S. Majarekar, R. N. Banavar and R. Ortega
An application of Immersion and Invariance to a Differential Algebraic System: A Power System,
Proceedings of the European Control Conference in Budapest Hungary, August 2009

N. S. Manjarekar, R. N. Banavar and R. Ortega
Nonlinear Control Synthesis for Asymptotic Stabilization of the Swing Equation using a Controllable Series Capacitor via Immersion and Invariance,
Proceedings of the 47th IEEE Conference on Decision and Control, pp:2493-2498, Cancun, Mexico, December 9-11, 200

Other control applications - dielectrophoresis, coordination and rendezvous, telescope modeling and control

Journals

S. Sahoo, R. N. Banavar and A. Sinha
Velocity alignment of unicycles with minimal sensing and coarse actuation
submitted to the IFAC journal Automatica,

Tripurari S. Kumar and Ravi N. Banavar
Design and development of telescope control system and software for the 50/80 cm Schmidt telescope
Journal of Optical Engineering, vol. 52(8):081607 (Accepted on May 2, 2013)

S. Sahoo, R. N. Banavar and A. Sinha
Rendezvous in space with minimal sensing and coarse actuation
IFAC journal Automatica, published online Dec

2012: <http://dx.doi.org/10.1016/j.automatica.2012.11.024>

H. Simha, H. Barve and R. N. Banavar

[Energy-optimal Control in a Dielectrophoretic System,](#)

Optimal Control Applications and Methods, Wiley, published online July 2011.

H. Simha, R. N. Banavar and D. E. Chang

[Reachability and Controllability of a Particle in a Dielectrophoretic System,](#)

Systems and Control Letters, Vol. 60, Issue 7, July 2011.

Conferences

Simha, H., Banavar, R.N.

[A 2D-planar dielectrophoretic model,](#)

Proceedings of the American Control Conference to be held in Montreal, Canada, June 2012.

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Simha, H., Banavar, R.N. & Chang, D.E

Aspects of time-optimal control of a particle in a dielectrophoretic system,

Proceedings of the IEEE Conference on Decision and Control and European Control Conference, Orlando, Florida USA, Dec. 2011 .

Soumya R. Sahoo, R. N. Banavar, Arpita Sinha

Rendezvous in Space with Minimal Sensing and Coarse Actuation,

Proceedings of the IEEE Conference on Decision and Control and European Control Conference, Orlando, Florida USA, Dec. 2011.

T. S. Kumar and Ravi. N. Banavar

Identification of Friction in the 50/80cm ARIES Schmidt Telescope Using the LuGre Model,

Proceedings of the 18th IFAC World Congress, Milan Italy, September 2011

Harsha Simha, R. N. Banavar, Chang Dong Eui

Reachability and Controllability of a Particle in a Dielectrophoretic System,

Proceedings of the 49th IEEE CDC, held in Atlanta, Georgia USA, December 15-17, 2010

Sarras Ioannis, Faruk Kazi, Ortega Romeo, R. N. Banavar
Total Energy-Shaping IDA-PBC Control of the 2D-Spider Crane,
Proceedings of the 49th IEEE CDC, held in Atlanta, Georgia USA, December 15-17, 2010.

Hrushikesh A . Brave and R. N. Banavar
Energy-optimal Control of a Particle in a Dielectrophoretic System,
Proceedings of the IEEE CDC Shanghai (Dec, 2009)

A. Banerjee, R. N. Banavar and D. Venkatesh
A Task Planner for a dual-arm robot: A geometric formulation,
Proceedings of TENCON 2008, Hyderabad, India, November 18-21, 2008

F. Kazi, R. N. Banavar, P. Mullhaupt and D. Bonvin
Stabilization of a 2D-SpiderCrane Mechanism Using Damping Assignment
Passivity-Based Control,
Proceedings of the IFAC World Congress in Seoul, South Korea, July 2008

N. S. Manjarekar, R. N. Banavar and R. Ortega
Application of Passivity-based Control to Stabilization of the SMIB System with
Controllable Series Devices,
Proceedings of the IFAC World Congress in Seoul, South Korea, July 2008

V. Joshi, R. N. Banavar, Rohit Hippalgaonkar
Design and Development of a Spherical Mobile Robot,
National Conference on Machines and Mechanisms, Bangalore, Dec. 2007

F. Kazi, R. N. Banavar, R. Ortega and N. S. Manjarekar
Minimizing Cable Swing in a Gantry Crane Using The IDA-PBC Methodology,
National Conference on Machines and Mechanisms, Bangalore, Dec. 2007

F. Kazi, R. N. Banavar, R. Ortega and N. S. Manjarekar
Point-to-Point Control of a Gantry Crane: A Combined Flatness And IDA-PBC
Strategy,
Proceedings of the European Control Conference, Kos, Greece, 2007