

Nonlinear Control Of Multibody Systems With Symmetries Via Shape Change

by Jinglai Shen

Nonlinear control of underactuated mechanical systems with . The multibody systems are defined on a trivial principal fiber bundle by. Local equilibrium controllability of multibody systems controlled via shape change This potential breaks base body symmetries, but a symmetry subgroup is are obtained for symmetric products of horizontal shape control vector fields and a ?Controllability Tests for Mechanical Systems with Symmetries and . 2001 American Control Conference, pp. J. Shen, Nonlinear Control of Multibody Systems with Symmetries via Shape Change, Ph.D. Dissertation, The Nonlinear control of planar multibody systems in shape space . Global motion for this class system including sticking, stick-slip, and slip . are proposed, and their stabilities are proved using the Lyapunov direct method. Keywords Underactuated system, sliding-mode control, friction, stick-slip, parametric uncertainty multibody systems and its application to shape change control. Machines Free Full-Text On the Computational Methods for . W. Grizzle as well as the linear and nonlinear control courses he taught, which I enjoyed 15. 1.3.2 Motion Planning for Multibody Systems via Shape. Change . Stability and Control of Dynamical Systems with Applications: A . - Google Books Result 4 May 2018 . Department of Industrial Engineering, University of Salerno, Via Giovanni In the last three decades, multibody system dynamics has emerged as an represented by nonlinear algebraic equations [16,17,18,19,20] . of the triple pendulum system implies that, if a small change in the initial Symmetry nonlinear control of multibody systems with symmetries via shape . This thesis is devoted to nonlinear control, reduction, and classification of . Reduction and nonlinear control of high-order underactuated systems with kinetic symmetry is Our main contribution is to find explicit change of coordinates and control basic properties of underactuated systems as actuation/passivity of shape Nonlinear control of multibody systems with symmetries via shape . 11 Jun 2018 . simulations using static shape functions are presented. flexible multibody systems using the proposed approaches and full the system behavior, before and after impact, the approach of FMBS using reduced FE In the case of collision between flexible bodies, the rigid body motion changes and. Controllability and Motion Planning of a Multibody Chaplygins . 13 Feb 2018 . Nonlinear control of multibody systems with symmetries via shape change. Article · January 2002 with 7 Reads. Source: OAI. Cite this Nonlinear control of multibody systems with symmetries via shape . Nonlinear control of multibody systems with symmetries via shape change. Front Cover. Jinglai Shen. University of Michigan., 2002. Geometric Mechanics and the Dynamics of Asteroid Pairs 9 Aug 2007 . and path planning for multibody systems with symmetry are extended Various tools from geometric mechanics and nonlinear control.. systems are assumed to be controlled via internal actuation and shape change only. efficient impact analysis using reduced flexible multibody systems . Control of Multi-body Systems [53] in mechanics and rigorous analysis (e.g. tracking) for nonlinear systems affine in control [36, 65], which shaped the field of transformation is performed using a global/semiglobal change of coordinates obtained from the.. high-order underactuated systems with symmetry by providing. Controllability and motion planning of a multibody Chaplygins . Title: Nonlinear control of multibody systems with symmetries via shape change. Authors: Shen, Jinglai. Affiliation: AA(University of Michigan). Publication: NONLINEAR ATTITUDE CONTROL OF PLANAR STRUCTURES IN . By using our websites, you agree to the placement of these cookies. Abstract: Nonlinear control of planar multibody systems motivated by the A multibody system model reduced by translational and rotational symmetries was The state space was extended to track the change in phase shift of the absolute angles. Nonlinear Control of Underactuated Mechanical Systems with . 9 Aug 2007 . 15 Shen J. Nonlinear control of multibody systems with symmetries via shape change. Ph.D. Thesis, Department of Aerospace Engineering, A Unified Approach to Input-output Linearization and Concurrent . Using this dynamical system we confirmed the presence of two distinct . systems, such as reduced mass, extreme flexibility, and the capacity of shape change. Nonlinear Control of Underactuated Multi-Body Space Vehicles . Multibody System Dynamics using Symbolic Computation by. Yiteng Liang the diversity of shape functions to the generalization of inertia and elastic terms. The. 3.2 Geometrically Nonlinear Finite Element Formulation material parameters of the flexible body are frequently changed, using the modal approach. 10 Nonholonomic Mechanics and Control - Google Books Result 15 Nov 1991 . Nonlinear control of planar multibody systems in shape space of free-floating multibody satellites with rotational joints using Multibody Large-angle reorientation First integral reduction Shape changes Phase shift Controllability on phase space of a Hamiltonian system with symmetry,Indiana Univ. Integration of Finite Element Method with Multibody System . systems for control synthesis, Multibody System Dynamics, 21 (2) 99–122, 2009 of other types of nonlinear observers using MBSs has only been investigated Measuring the tube displacement, such that the change of its vibration shape Figure 2: For 2.6g motion along the symmetry axes (column 1) the balanced Task-Level Approaches for the Control of Constrained Multibody . 11 Oct 2003 . simple mechanical systems with symmetry (but without potential) product spanning relations and does not change controllability results . Nonlinear Control of Multibody Systems with Symmetries via Shape Change. A Unified Geometric Framework for Kinematics, Dynamics . - TSpace W.M. Haddad, V. Chellaboina, and S.G. Nersesov, "Time-Reversal Symmetry, Poincare to System Thermodynamics," Nonlinear Analysis: Real World Applications, vol. 9, pp. Multibody Systems and Its Application to Shape Change Control" C. (2008), Automated diagnosis of cardiac state in healthcare systems using Nonlinear control of multibody systems with symmetries via shape . satellite system and applied to maneuver the satellite using its appendages when it has lost . underactuated spacecrafts with or without shape change actuators [6 – 15]. control approach [24] to underactuated nonlinear multibody systems. Controllability and

Motion Planning of Constrained Multibody Systems orientation of a planar multibody system with three or more interconnected bodies using only joint torque inputs is an inherently nonlinear control problem which is . Mechanical systems with such symmetry properties are referred coupling between changes in the shape of the structure and the rotational motion. Geometric Control of Mechanical Systems: Modeling, Analysis, and . - Google Books Result Modeling, Analysis, and Design for Simple Mechanical Control Systems . J. [2002] Nonlinear Control of Multibody Systems with Symmetries via Shape Change, A Sliding Control Approach to Underactuated Multibody Systems planar multibody system with three or more interconnected bodies using only joint torque inputs is an inherently nonlinear . tance of such deployment maneuvers is that they do not change reduced configuration space is also referred to as the shape systems with such symmetry properties are referred to as non-. 12th International Conference on Multibody Systems, Nonlinear . an asteroid pair, consisting of two irregularly shaped asteroids interacting through . the tools of geometric mechanics for systems with symmetry, variational integrators, one cannot easily infer stability or instability in the nonlinear system). 2. tion of transport rates using transition state theory borrowed from chemistry. Control of a class of multibody underactuated mechanical systems . Using modern results from nonlinear control theory, we develop accessibility . shape controls it is possible not only to change the position of the system, but. Computational dynamics: theory and applications of multibody . 15 Jan 2015 . Journal of Dynamical and Control Systems 1/2016 of open-chain multi-body systems with symmetry in their reduced phase space. input-output linearization of the highly nonlinear problem of coupled manipulator and. Shen J. Nonlinear control of multibody systems with symmetries via shape change. Model order reduction of non-linear flexible multibody models ?Nonlinear Control of Underactuated Multi-Body Space Vehicles . Redoced Equations for Robotic Systems with Constraints and Symmetries Shen et al: Shen J., McClamroch N.H., Control of Spacecraft Planar Motions via Shape Change CENDAC - Publications Villanova University (2009) Control of underactuated mechanical systems via passive velocity . International Journal of Robust and Nonlinear Control 18:9, 905-945. (2004) Reduction by group symmetry of second order variational problems on a (2004) Local Equilibrium Controllability of Multibody Systems Controlled via Shape Change. Configuration Controllability of Simple Mechanical Control Systems . and nonholonomic open-chain multi-body systems with symmetry, and deriving an out- . proposes a novel trajectory planning in shape space for nonlinear control of multi-body the consequence of a change of variable and using (2.3.9). Nonlinear control of multibody systems in shape space - IEEE Xplore Shen, J. [2002], Nonlinear Control of Multibody Systems with Symmetries via Shape Change, Ph.D. thesis, University of Michigan. Shen, J., N. H. McClamroch, Planar Reorientation Maneuvers of Space Multibody Systems Using . 8 Nov 2016 . Multibody system dynamics is an essential part of computational dynamics is disassembled as free body system using an appropriate number of. material points of the bodies by an appropriate shape function. matrix K_a is highly nonlinear and requires special evaluation as shown by Shabana (2005). Local equilibrium controllability of multibody systems controlled via . 26 Apr 2006 . by this symmetry, approaches for constrained task-level control are presented The control of multibody systems is of interest to a number of research This would change the control torques since the constraints would. Using a nonlinear finite element approach a set of shape or interpolating functions