



Colegio de San Juan de Letran
Dominican Avenue, Abucay, Bataan
Library and Media Services

RESEARCH GUIDE: STATICS OF RIGID BODIES

TABLE OF CONTENTS

I. Scope Note

II. Search Aids

III. Information Resources

A. Library Resources

a. E-Journals

b. E-Theses

B. Open Access

a. Free E-Books

b. Free E-Journals

c. Free E-Theses

C. Professional Organizations

D. Other Related Web Portals

E. Related Research Guides

IV. Tutorials

RESEARCH GUIDES

STATICS OF RIGID BODIES

I. SCOPE NOTE

Statics is the study of bodies and structures that are in equilibrium. For a body to be in equilibrium, there must be no net force acting on it. In addition, there must be no net torque acting on it.

<https://www.britannica.com/science/mechanics/Rigid-bodies>

II. SEARCH AIDS (BT: Broader Term, RT: Related Term, NT: Narrow Term)

BT:

- Mechanics

RT:

- Statics
- Vectors
- Vector operations
- Force
- Force vector
- Moment
- Equilibrium
- Force system resultants
- Structural analysis
- Internal forces
- Friction
- Center of gravity
- Moments of inertia
- Virtual work
- Varignon's theorem
- Loading
- Shear force
- Bending moment
- Hydrostatic forces
- Distributed loading
- Equivalent force system

NT:

- Couples
- Centroid
- Frictional forces
- Moment of a force
- Cross product
- Dot product

- Beams
- Cables
- Space trusses
- Plane trusses
- Dry static friction
- Wedge and belt friction
- Moment of a couple
- Torque
- Resultant force
- Turning effect
- Moment of a force in 2-D (scalar formulation)
- Moment of a force in 3-D (vector formulation)

III. INFORMATION RESOURCES

A. LIBRARY RESOURCES

Note: For the appropriate access credentials, please contact the Letran Bataan Library

➤ E-JOURNALS

- Advances in Mechanical Engineering.
https://www.proquest.com/publication/publications_237349
- Acta Mechanica. https://www.proquest.com/publication/publications_47448
- Journal of Physics: Conference Series.
https://www.proquest.com/publication/publications_4998668
- IOP Conference Series. Materials Science and Engineering.
https://www.proquest.com/publication/publications_4998670
- Theoretical and Applied Mechanics Japan.
https://www.proquest.com/publication/publications_2029100
- International Journal of Robust and Non Linear Control.
https://search.proquest.com/central/publication/publications_1026344
- Computer Methods in Applied Mechanics and Engineering.
https://search.proquest.com/central/publication/publications_2045269
- Nonlinear Dynamics.
https://search.proquest.com/central/publication/publications_2043746
- Mathematical Problems in Engineering.
https://search.proquest.com/central/publication/publications_237775
- Applied Mechanics and Materials.
https://search.proquest.com/central/publication/publications_2029177

➤ E-THESES

- Burke, R. S. (2021). Rigid body dynamics of ship hulls via hydrostatic forces calculated from FFT ocean height fields (Order No. 28419543). Available from ProQuest Central.

- (2541758031). Retrieved from <https://www.proquest.com/dissertations-theses/rigid-body-dynamics-ship-hulls-via-hydrostatic/docview/2541758031/se-2?accountid=190548>
- Ichimaru, S. (2020). Meso-mechanical modeling of pervious concrete (Order No. 10933131). Available from ProQuest Central. (2410459566). Retrieved from <https://www.proquest.com/dissertations-theses/meso-mechanical-modeling-pervious-concrete/docview/2410459566/se-2?accountid=190548>
 - Kakrasul, J. I. (2018). Geosynthetic reinforced retaining walls with limited fill space under static footing loading (Order No. 10746015). Available from ProQuest Central. (2026947444). Retrieved from <https://www.proquest.com/dissertations-theses/geosynthetic-reinforced-retaining-walls-with/docview/2026947444/se-2?accountid=190548>
 - Taylor, J. R. (2018). Toward consistent robotics simulation through validation (Order No. 10929572). Available from ProQuest Central. (2092730465). Retrieved from <https://www.proquest.com/dissertations-theses/toward-consistent-robotics-simulation-through/docview/2092730465/se-2?accountid=190548>
 - Li, K. (2018). An investigation into the torque capabilities of high gear ratio magnetic gearboxes (Order No. 10845412). Available from ProQuest Central. (2088968341). Retrieved from <https://www.proquest.com/dissertations-theses/investigation-into-torque-capabilities-high-gear/docview/2088968341/se-2?accountid=190548>
 - Wilson, S. P. (2015). A methodology for physically-based contact and meniscus properties in rigid-body computational knee modeling (Order No. 1594187). Available from ProQuest Central. (1707882846). Retrieved from <https://search.proquest.com/docview/1707882846?accountid=190548>
 - Pan, E. A. (2013). The use of physical and virtual manipulatives in an undergraduate mechanical engineering (dynamics) course (Order No. 3573519). Available from ProQuest Central. (1435605243). Retrieved from <https://search.proquest.com/docview/1435605243?accountid=190548>
 - Ribaric, A. (2012). Orientation invariant characteristics of deformable bodies in multibody dynamics (Order No. 3522714). Available from ProQuest Central. (1151811187). Retrieved from <https://search.proquest.com/docview/1151811187?accountid=190548>
 - Thakur, A. (2011). Physics preserving model simplification for interactive virtual environments (Order No. 3495355). Available from ProQuest Central. (923616293). Retrieved from <https://search.proquest.com/docview/923616293?accountid=190548>

B. OPEN ACCESS

➤ FREE E-BOOKS

- Khalfallah, Salah (2018). Structural Analysis 1: Statically Determinate Structures. London: ISTE Ltd.: New Jersey: John Wiley & Sons. <https://www.pdfdrive.com/structural-analysis-volume-1-statically-determinate-structures-e188628483.html>
- Khalfallah, Salah (2018). Structural Analysis 2: Statically Indeterminate Structures. London: ISTE Ltd.: New Jersey: John Wiley & Sons. <https://www.pdfdrive.com/structural-analysis-volume-2-statically-indeterminate-structures-e188630674.html>

- Huang, L. (2017). A Concise Introduction to Mechanics of Rigid Bodies: Multidisciplinary Engineering (2nd ed.). Switzerland: Springer. <https://www.pdfdrive.com/a-concise-introduction-to-mechanics-of-rigid-bodies-multidisciplinary-engineering-e158194436.html>
- Joag, Pramod S. (2016). An Introduction to Vectors, Vector Operators and Vector Analysis. Delhi: Cambridge University Press. <https://www.pdfdrive.com/an-introduction-to-vectors-vector-operators-and-vector-analysis-e182285447.html>
- Hibbeler, R.C. (2015). Structural Analysis (9th ed.). Boston: Pearson Prentice Hall. <https://www.pdfdrive.com/structural-analysis-hibbeler-d158106803.html>
- Meriam, J.L., Kraige, L.G., Bolton, J.N. (2015). Engineering Mechanics. Volume I: Statics (8th ed.). Hoboken, NJ: John Wiley & Sons. <https://www.pdfdrive.com/engineering-mechanics-statics-8th-edition-d183890638.html>
- Huang, L. (2012). A Concise Introduction to Mechanics of Rigid Bodies: Multidisciplinary Engineering. New York: Springer. <https://www.pdfdrive.com/a-concise-introduction-to-mechanics-of-rigid-bodies-multidisciplinary-engineering-e162013678.html>
- Daqaq, Mohammed F. (2019). Dynamics of particles and rigid bodies: a self-learning approach. United Kingdom: John Wiley & Sons, Inc. <https://www.pdfdrive.com/dynamics-of-particles-and-rigid-bodies-a-self-learningapproach-d189889071.html>
- Jazar, Reza N. (2011). Advanced dynamics: rigid body, multibody, and aerospace applications. New Jersey: John Wiley & Sons, Inc. <https://www.pdfdrive.com/advanceddynamics-rigid-body-multibody-and-aerospace-applications-d164868075.html>
- Oñate, Eugenio. (2009). Structural Analysis with the Finite Element Method. Linear Statics. Volume 1. Basis and Solids. Spain: Springer. <https://www.pdfdrive.com/structural-analysis-with-the-finite-element-method-linearstatics-volume-1-basis-and-solids-lecture-notes-on-numerical-methods-in-engineeringand-sciences-v-1-d159776198.html>
- Ruina, Andy and Pratap, Rudra. (2013). Introduction to STATICS and DYNAMICS. Oxford Press. <https://www.pdfdrive.com/statics-dynamics-d18835105.html>

➤ FREE E-JOURNALS

- Journal of the Mechanics and Physics of Solid. <https://www.sciencedirect.com/journal/journal-of-the-mechanics-and-physics-of-solids>
- International Journal of Mathematical Education in Science and Technology. <https://www.tandfonline.com/doi/abs/10.1080/0020739X.2020.1756493>
- Journal of Physics. <https://iopscience.iop.org/article/10.1088/1742-6596/1358/1/012083/pdf>
- Computation-Open Access Journal. <https://www.mdpi.com/journal/computation>

➤ FREE E-THESES

- Matser, A. (. (2021). Manufacturability in automatic synthesis of planar rigid body spring mechanisms. (Masters Thesis). Delft University of Technology. Retrieved from <http://resolver.tudelft.nl/uuid:081e05f5-556e-4e46-a17d-267e09a33ce0>

- Eppenga, K. (. (2021). Necessity of non-rigid body models for launch vehicles. (Masters Thesis). Delft University of Technology. Retrieved from <http://resolver.tudelft.nl/uuid:4dc937c1-819e-4801-afe4-f654b03dce65>
- Singh, H. (2019). Discontinuities, balance laws, and material momentum. (Doctoral Dissertation). Virginia Tech. Retrieved from <http://hdl.handle.net/10919/86664>
- Fazeli, N. (2019). Inference and learning for rigid-body models of manipulation. (Thesis). MIT. Retrieved from <http://hdl.handle.net/1721.1/123769>
- Sangamesh Deepak, R. (2018). Static balancing of rigid-body linkages and compliant mechanisms. (Doctoral Dissertation). Indian Institute of Science. Retrieved from <http://etd.iisc.ac.in/handle/2005/3241>
- Serpelloni, E. (2017). Bang-Bang practical stabilization of rigid bodies. (Doctoral Dissertation). University of Toronto. Retrieved from <http://hdl.handle.net/1807/79471>
- Lewin, C. (2016). Constraint based simulation of soft and rigid bodies. (Doctoral Dissertation). University of Bath. Retrieved from [https://researchportal.bath.ac.uk/en/studentthesis/constraint-based-simulation-of-soft-and-rigid-bodies\(361f3aaa-7485-40bd-b60a-485520d4886b\).html](https://researchportal.bath.ac.uk/en/studentthesis/constraint-based-simulation-of-soft-and-rigid-bodies(361f3aaa-7485-40bd-b60a-485520d4886b).html)
- Choi, H. (2014). Dynamic modeling and simulations of rigid-flexible coupled systems using quaternion dynamics. (Doctoral Dissertation). University of Southern California. Retrieved from <http://digitallibrary.usc.edu/cdm/compoundobject/collection/p15799coll3/id/421237/ec/2126>
- Long, J. (2013). Animating Non-Rigid Bodies Using Motion Capture. (Doctoral Dissertation). Brigham Young University. Retrieved from <https://scholarsarchive.byu.edu/cgi/viewcontent.cgi?article=4395&context=etd>

C. PROFESSIONAL ORGANIZATIONS

- Institute of Industrial and Systems Engineers. <https://www.iise.org/Home/>
- Society of Manufacturing Engineers. <https://www.sme.org/>
- IEEE Advancing Technology for Humanity. <https://www.ieee.org/>
- IEEE Computer Society. <https://www.computer.org/>

D. OTHER RELATED WEB PORTALS

- Mechanics Map. <http://adaptivemap.ma.psu.edu/>
- Coursera. <https://www.coursera.org/learn/mastering-statics>
- Digital Commons. <https://digitalcommons.unl.edu/physicskatz/148/>
- Open Stax. <https://openstax.org/books/university-physics-volume-1/pages/12-2-examples-of-static-equilibrium>
- Academia. https://www.academia.edu/Documents/in/Dynamics_of_rigid_bodies

E. RELATED RESEARCH GUIDES

- Universiti of Malaysia Perlis. <https://libguides.unimap.edu.my/PDT101>
- Norwalk Community College Library. <https://norwalkcc.libguides.com/engineering>
- The University of British Columbia.

<https://open.library.ubc.ca/cIRcle/collections/ubctheses/831/items/1.0051676>

- University of Houston. <https://guides.lib.uh.edu/industrial>
- Columbia University Libraries. <https://guides.library.columbia.edu/c.php?g=207448&p=1368842>

IV. TUTORIALS

- Statics of Rigid Bodies: Introduction. https://www.youtube.com/watch?v=-699CH44_9o
- Statics of Rigid Bodies: Introduction (Part 2). <https://www.youtube.com/watch?v=esIWov96rnQ>
- Statics of Rigid Bodies: Resultant of Force System (Part 1).
<https://www.youtube.com/watch?v=2crfwwB7dKk>
- Statics of Rigid Bodies: Resultant of Force System (Part 2).
<https://www.youtube.com/watch?v=qjeMkJiIXi4>
- Statics of Rigid Bodies: Resultant of Force System (Part 3).
<https://www.youtube.com/watch?v=InHV6hjoOeM>
- Statics of Rigid Bodies: Resultant of Force System (Part 4).
<https://www.youtube.com/watch?v=JOKYbyDbT1Q>
- Statics of Rigid Bodies: Equilibrium of Force System (Part 1).
<https://www.youtube.com/watch?v=5Anv9eARv8>
- Statics of Rigid Bodies: Equilibrium of Force System (Part 2).
- Engineering 4 Free. <https://www.engineer4free.com/dynamics.html>
- Course Hero. <https://www.coursehero.com/file/34632560/Tutorials-Engineering-Mechanicspdf/>

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