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Education

M. Eng in 2006 and PhD in 2009 in Naval Architecture and Ocean Engineering, Department of Naval Architecture and Ocean Engineering, Osaka University Japan, under the supervision of Prof. Kazuhiko Hasegawa.

B.Tech (Hons.) in Naval Architecture, Department of Naval Architecture, IIT Kharagpur, in 1995.

Employment

01/ 2023 - till date	Professor	Ocean Engineering & Naval Architecture Department, IIT Kharagpur, India
06/ 2016 - 12/ 2022	Associate Professor	
12/ 2009 - 05/ 2016	Assistant Professor	
11/ 2009	Post Doctoral Researcher, Pusan National University, South Korea	
1995 - 2006	Naval Architect, The Shipping Corporation of India Ltd., Mumbai, India	

Research interests: Ship and underwater vehicle dynamics, mathematical modeling and simulation, Ship and floating structure design

Member: The Japan Society of Naval Architect and Ocean Engineers, (JASNAOE), Japan

Sponsored projects

Involved in research projects sponsored by Ministry of Shipping, Ministry of Earth Sciences, Singapore Maritime Institute and Naval Research Board.

Consultancy projects

Involved in several technical consultancy projects sponsored by NSTL (Visakhapatnam), DSIR (New Delhi), West Bengal Government, Indian Navy, GRSE (Kolkata), Cybermarine Technologies Ltd., Pipavav Defence & Offshore Ltd., CIFT (Cochin), Bharati Shipyard Ltd., Mumbai, Kolkata Port Trust, IMU, Visakhapatnam, Manaksia Ltd, Kolkata, Larsen

and Toubro, Mumbai, Marine House, Bangladesh, M/s Marintek Design & Engineering, Mazagon Dock Limited (Mumbai)

Students

PhD Students and their working area:

Completed:

1. Dr. Anil Kumar Dash, Uncertainty, stability and bifurcation analysis of a twin-propeller twin-rudder ship in maneuvering motion. March 2016. Presently working as Assistant Professor, Department of Civil Engineering, National Institute of Technology Calicut, Kerala 673 601, India.
2. Dr. Joseph Prabhu J, Propulsion and maneuvering dynamics of ships. March 2019. Joint Supervisor: Dr. Mohammed Rabius Sunny. Presently working as Surveyor, Research & Innovation Cell, Indian Register of Shipping, Mumbai 400 072, Maharashtra, India.
3. Dr. Subhashis Nandy, Dynamics and Control of Cycloidal Propeller. November 2020. Presently working as Post Doctoral Researcher, Department of Aerospace Engineering, IIT Bombay, Powai, Mumbai 400 076, Maharashtra, India.
4. Dr. Parikshit Kundu, Performance Comparison of Hydrofoils Used for Current Turbines with Vortex Generators and Tubes. July 2021. Supervisor: Dr. Arunjyoti Sarkar. Presently working as Institute Post-Doctoral fellow at Indian Institute of Technology, Kalyanpur, Kanpur, 208 016, India.
5. Dr. Prasad Vinayak Patil, Surface and Underwater Marine Vehicles: Dynamics, Maneuvering and Navigation. Joint Supervisor: Dr. Om Prakash Sha. December 2022. Presently working as Assistant Professor, Dept. of Mechatronics, Manipal Institute of Technology (MIT) MAHE, Manipal, Karnataka, 576 104, India.

Ongoing:

6. Mr. Sree Krishna Prabu. C, Ship design. Joint Supervisor: Dr. Om Prakash Sha.
7. Mr. Kareem Khan M D, Underwater vehicle maneuvering. Joint Supervisor: Dr. Om Prakash Sha.
8. Mr. Sharat Kumar, Measurement of flow characteristics behind ship.
9. Mr. Diwakar Gurung, Underwater Robotics. Supervisor: Dr. Cheruvu Siva Kumar.
10. Mr. Navinder Singh Bhamra, Fluid structure interaction. Supervisor: Dr. Kiran Vijayan.
11. Mr. Swapnil Laxman Jagadale, Hydrodynamics of underwater vehicle. Joint Supervisor: Dr. Anirban Bhattacharyya.
12. Mr. Abbas Haider, Marine hydrodynamics.

M. S Students: 2 completed, M. Tech Students: 22 completed

Courses taught:

Autumn Semester:

NA30203: Resistance, NA39011: Hydrodynamics Laboratory, NA60203: Resistance and Flow, AG60103: Principles of Fishing Technology,

Spring Semester:

NA39006: Marine Design Laboratory - I (Jointly with Prof. O. P. Sha), NA31002:

Marine Design (Jointly with Prof. R. Ghoshal), AG69012: Aquacultural Engineering Lab. II (Jointly with Prof. Subhadip Dey)

Publications

Journal

1. Design optimization of an AUV for performing depth control maneuver, Prasad Vinayak Patil, Md Kareem Khan, Manu Korulla, Vishwanath Nagarajan, Om Prakash Sha, *Ocean Engineering*, (2022), <https://doi.org/10.1016/j.oceaneng.2022.112929>.
2. Vibration analysis of cycloidal propeller blade during ship maneuvering, Joseph Prabhu J, Anil Kumar Dash, Vishwanath Nagarajan, Mohammed Rabius Sunny, *Journal of Marine Science and Technology*, (2022).
<https://doi.org/10.1007/s00773-022-00899-1>
3. Stochastic finite element analysis of composite cycloidal propeller blade during crash-stop ship maneuver, Anil Kumar Dash, Joseph Prabhu, Vishwanath Nagarajan, *Composite Structures*, Vol. 286, pp 115306, (2022),
<https://doi.org/10.1016/j.compstruct.2022.115306>.
4. Manoeuvring simulations of Autonomous Underwater Vehicle using quaternion, Prasad Vinayak Patil, Md. Kareem Khan, Manu Korulla, Vishwanath Nagarajan, Om Prakash Sha, *Defence Science Journal*, Vol. 72, No. 2, pp. 290 - 307, Defence Scientific Information & Documentation Centre (DESIDOC), DRDO, Govt of India, (2022),
<https://doi.org/10.14429/dsj.72.16858>.
5. Surface pressure measurements on a generic submarine hull format high angles of incidence, Md. Kareem Khan, Manu Korulla, Vishwanath Nagarajan and Om Prakash Sha, *Journal of Marine Science and Technology*, Vol. 27, 677 - 694, (2022),
<https://doi.org/10.1007/s00773-021-00863-5>.
6. Bio-inspired aquatic propulsion using piezoelectric effect, Navinder Singh Bhamra, Kiran Vijayan, Vishwanath Nagarajan, *Journal of Intelligent Material Systems and Structures*, pp 1 - 9, (2021), DOI: 10.1177/1045389X211048230.
7. Model experiments with different cycloidal propeller algorithms using same electric controller, Subhashis Nandy, Vishwanath Nagarajan, Om Prakash Sha, *Proceedings of the Institution of Mechanical Engineers, Part M: Journal of Engineering for the Maritime Environment*, Vol. 236 no. 2, pp. 436 - 461 (2021),
<https://doi.org/10.1177/14750902211036340>.
8. Numerical simulation of ship navigation in rough seas based on ECMWF data, Patil Prasad Vinayak, C. Sree Krishna Prabu, N. Vishwanath, O. P. Sha, *Brodogradnja*, Vol. 72, No. 1, pp. 19 - 58 (2021), <http://dx.doi.org/10.21278/brod72102>, ISSN 0007-215X, eISSN 1845-5859.
9. Study on the lightship characteristics of merchant ships, C. Sree Krishna Prabu, N. Vishwanath, O. P. Sha, *Brodogradnja* Vol. 71 No. 3, pp. 37 ~ 70 (2020), ISSN 0007-215X, eISSN 1845-5859, <http://dx.doi.org/10.21278/brod71304>.

10. Performance of S1210 Profile Used in Current Turbine Blades With Tubes Inserted at a Regular Interval, P. Kundu, A. Sarkar, N. Vishwanath, *Journal of Offshore Mechanics and Arctic Engineering*, ASME, Vol. 142, pp. 062002-1 - 062002-13 (2020).
11. PID type controller for marine cycloidal propeller - a simulation study, S. Nandy, J. J. Prabhu, V. Nagarajan, O. P. Sha, *Journal of Marine Science and Technology*, Vol. 25, pp. 111 - 137 (2020), <https://doi.org/10.1007/s00773-019-00635-2>.
12. Improvement of performance of S1210 hydrofoil with vortex generators and modified trailing edge, P. Kundu, A. Sarkar, V. Nagarajan, *Renewable Energy*, Vol. 142, pp. 643 - 657 (2019).
13. On the hydrodynamic loading of marine cycloidal propeller during maneuvering, J. J. Prabhu, A. K. Dash, V. Nagarajan, O. P. Sha, *Applied Ocean Research*, Vol. 86, pp. 87 - 110 (2019).
14. On the heuristic based electronic control of marine cycloidal propeller, S. Nandy, V. Nagarajan, O. P. Sha, *Applied Ocean Research*, Vol. 78, pp. 134 - 155 (2018), <https://doi.org/10.1016/j.apor.2018.05.013>.
15. Navigational Safety and Traffic Pattern Analysis Using AIS Data on the Western Coast of India, S. Mandal, V. Nagarajan, O. P. Sha, *Current Science*, Vol. 114, (2018).
16. CFD simulations of steady drift and yaw motions in deep and shallow water, S. RoyChoudhury, A. K. Dash, V. Nagarajan, O. P. Sha, *Ocean Engineering*, Vol. 142, pp 161 - 184 (2017).
17. On the fluid structure interaction of a marine cycloidal propeller, J Prabhu J, V Nagarajan, M R Sunny, O P Sha, *Applied Ocean Research*, <http://dx.doi.org/10.1016/j.apor.2017.01.019>, Vol. 64, pp 105 - 127 (2017).
18. Measurement of flow characteristics in propeller slipstream of a twin propeller twin rudder model ship by S Kumar, V Nagarajan, O P Sha, *International Shipbuilding Progress*, DOI: 10.3233/ISP-160121, Vol. 63, no. 1 - 2, pp. 1 - 40, (2017).
19. Roll-induced bifurcation in ship maneuvering under model uncertainty, A K Dash, Praveen P C, Md. Kareem Khan, V Nagarajan, O P Sha, *Journal of Marine Science and Technology*, DOI: 10.1007/s00773-016-0382-1, Vol. 21, pp 689 - 708, (2016).
20. Bifurcation analysis of a high speed twin-propeller twin-rudder ship maneuvering model in roll-coupling motion, A K Dash, V Nagarajan, O P Sha, *Nonlinear Dynamics*, DOI: 10.1007/s1107, Vol. 83, pp 2035 - 2053 (2015).
21. Uncertainty assessment for ship maneuvering mathematical model, A K Dash, V Nagarajan, O P Sha, *International Shipbuilding Progress*, Vol. 62, pp 57 - 111 (2015).
22. Observation on forces and motions of a mariculture cage from model and prototype experiments, J Geo James, S Kumar, Dharma Sree K. K., V Nagarajan, C K Mukherjee, and B Dash, *IEEE Journal of Oceanic Engineering*, DOI: 10.1109/JOE.2015.2483824, Volume: PP, Issue: 9 (2015).
23. A stochastic response surface approach for uncertainty propagation in ship maneuvering, A K Dash and V Nagarajan, *International Shipbuilding Progress*, 61 129 - 161 (2014).

24. CFD aided modelling of anti-rolling tanks towards more accurate ship dynamics, Bhushan Uday Taskar, D DasGupta, V Nagarajan, S Chakraborty, A Chatterjee, O P Sha, *Ocean Engineering*, 92, 296 - 303 (2014).
25. Manoeuvring characteristics of twin-rudder systems: rudder-hull interaction effect on the manoeuvrability of twin-rudder ships, S Khanfir, K Hasegawa, V Nagarajan, K Shouji, S K Lee, *Journal of Marine Science and Technology*, 16: 472 - 490 (2011).
26. Installing single-propeller twin-rudder system with less asymmetric maneuvering motions, D H Kang, V Nagarajan, Y Gonno, Y Uematsu, K Hasegawa, S C Shin, *Ocean Engineering*, 38: 1184 - 1196 (2011).
27. A proposal for propulsion performance prediction of single-propeller twin-rudder ship, V Nagarajan, D H Kang, K Hasegawa, K Nabeshima, T Arii, *Journal of Marine Science and Technology*, 14: 296 - 309 (2009).
28. Comparison of the mariner Schilling rudder and the mariner rudder for VLCCs in strong winds, V Nagarajan, D H Kang, K Hasegawa, K Nabeshima, *Journal of Marine Science and Technology*, 13: 24 - 39 (2008).
29. Mathematical model of single-propeller twin-rudder ship, D H Kang, V Nagarajan, K Hasegawa, M Sano, *Journal of Marine Science and Technology*, 13: 207 - 222 (2008).
30. A study on improving the course-keeping ability of a pure car carrier in windy conditions, K Hasegawa, D H Kang, M Sano, V Nagarajan, M Yamaguchi, *Journal of Marine Science and Technology*, 11: 76 - 87 (2006).

Conference

1. Gurung, D., Kumar, C.S., Nagarajan, V. (2023). Robust Path Following Control of Autonomous Underwater Vehicle Using Combined Time Delay Estimation and Backstepping Method. In: Gupta, V.K., Amarnath, C., Tandon, P., Ansari, M.Z. (eds) *Recent Advances in Machines and Mechanisms. Lecture Notes in Mechanical Engineering*. Springer, Singapore. https://doi.org/10.1007/978-981-19-3716-3_47.
2. N Vishwanath, S Nandy, O P Sha, *Electrical Control of Cycloidal Propeller - Challenges and Opportunities*, Annual Autumn Meeting of JASNAOE 2019, Himeji-shi, Hyougo, Japan, 21 - 22 November, 2019.
3. C Sree Krishna Prabu, N Vishwanath, O P Sha, *Analysis of longitudinal strength of a bulk carrier in waves*, 6th International Conference on Ship & Offshore Technology, ICSOT 2019, IIT Kharagpur, India, 7 - 8 November, 2019.
4. Md. Kareem Khan, N. Vishwanath, O P Sha, M Korulla, *Simulation studies on the effect of out-of-plane loads on submarine manoeuvring*, Undersea Defence Technology Asia (UDT) 2019 Conference, 29th - 30th January 2019, Singapore.
5. S Nandy, V Nagarajan, O P Sha, *Towards the implementation of electronic control of cycloidal propellers: experimental investigation*, Annual Autumn Meeting of JASNAOE 2018, Kashiwa-shi, Chiba, Japan, 26 - 27 November, 2018.
6. P V Patil, Vishwanath Nagarajan, Om Prakash Sha, *On the ship navigation in Geodetic frame*, The International Marine Simulator Forum, MARSIM 2018, Halifax, Nova Scotia, Canada, 12 - 16 August 2018.

7. Joseph Prabhu J, N. Vishwanath, Mohammed R. Sunny, O. P. Sha, Effect of Rotating Disc and Flow Separation Phenomena on the Performance of a Marine Cycloidal Propeller, Proceedings of the Twenty-seventh International Ocean and Polar Engineering Conference, San Francisco, CA, USA, June 25 - 30, 2017, The International Society of Offshore and Polar Engineers (ISOPE) ISBN 978-1-880653-97-5; ISSN 1098 - 6189, pp 1128 - 1135.
8. S Nandy, V Nagarajan, O P Sha, Optimization of blade pitching angle of electronically controlled marine cycloidal propeller, MARHY 2016, Chennai, IIT Madras, India, 24- 25 November 2016.
9. J Prabhu J, V Nagarajan, M R Sunny, O P Sha, On the fluid structure interaction of marine cycloidal propeller during maneuvering, MARHY 2016, IIT Madras, Chennai, India, 24- 25 November 2016.
10. P V Patil, V Nagarajan, O P Sha, On the design of a propeller for circulating water tank, MARHY 2016, IIT Madras, Chennai, India, 24- 25 November 2016.
11. S Nandy, V Nagarajan, O P Sha, Improving efficiency of marine cycloidal propeller for coastal shipping, International Conference on Ship & Offshore Technology, ICSOT 2015, IIT Kharagpur, India, 10 - 11 December 2015.
12. J Prabhu J, V Nagarajan, O P Sha, Unsteady flow analysis of marine cycloidal propeller blades, International Conference on Ship & Offshore Technology, ICSOT 2015, IIT Kharagpur, India, 10 - 11 December 2015.
13. S Mandal, V Nagarajan, O P Sha, Coastal navigation safety and traffic pattern analysis using AIS data, International Conference on Ship & Offshore Technology, ICSOT 2015, IIT Kharagpur, India, 10 - 11 December 2015.
14. S Nandy, V Nagarajan, O P Sha, An alternative control option for marine cycloidal propeller, Indian National Conference on Applied Mechanics (INCAM 2015), IIT Delhi, New Delhi, 13 - 15 July 2015.
15. J Prabhu J, V Nagarajan, O P Sha, Hydrodynamic behavior of Marine Cycloidal Propeller, Indian National Conference on Applied Mechanics (INCAM 2015), IIT Delhi, New Delhi, 13 - 15 July 2015.
16. J Prabhu J, V Nagarajan, R S Mohammed, O P Sha, Estimation of hydrodynamic loading and vibration analysis of a marine cycloidal propeller. In: International Conference on Computing in Mechanical Engineering, ICCME 2015, SCMS, Kochi, Kerala, India, 10 ~ 13 August 2015.
17. S Mandal, V Nagarajan, O P Sha, Analysis and Application of AIS data. In: International Conference on Computing in Mechanical Engineering, ICCME 2015, 10 ~ 13 August 2015, SCMS, Ernakulam, Kerala, India.
18. Sha, O. P., RoyChoudhury, S., Dash, A. K., Nagarajan, V. Development of shallow water maneuvering mathematical model of a large tanker using steady RANS solver. In: European Inland Waterway Navigation (EIWN) Conference, 10-12 September, 2014, Budapest, Hungary.
19. S RoyChoudhury, V Nagarajan, O P Sha, Prediction of Ship Maneuvering Characteristics using CFD, 24th International Ocean and Polar Engineering Conference, ISOPE-2014, Busan, Korea, June 15-20, 2014.

20. Mohd Atif Siddiqui, V Nagarajan, C K Mukherjee, Modeling the Forces and Motions of a Single Point Mooring Marine Aquaculture Cage, 24th International Ocean and Polar Engineering Conference, ISOPE-2014 Busan, Busan, Korea, June 15 - 20, 2014.
21. J Prabhu, V Nagarajan, O P Sha, Non-linear Forced Vibration Analysis of a Marine Cycloidal Propeller, International Mechanical Engineering Congress 2014, NIT Tiruchirappalli, June 13 - 15, 2014.
22. S Mandal, S Suman, V Nagarajan, O P Sha, Ship Collision Risk Assessment Using AIS Data, International Mechanical Engineering Congress 2014, NIT, Tiruchirappalli, June 13 - 15, 2014.
23. A K Dash, V Nagarajan, O P Sha, A polynomial chaos approach to predict uncertainty in twin-propeller twin-rudder ship maneuvers, Annual Spring Meeting, The Japan Society of Naval Architects and Ocean Engineers, Sendai, Japan, 26, 27 May 2014.
24. Mohd. Atif Siddiqui, V Nagarajan, Numerical modeling of an offshore fishing cage, International Conference on Applied Mathematical Models (ICAMM 2014), PSG College of Technology, Coimbatore, 03 - 05 January 2014.
25. A K Dash, V Nagarajan, Stability Analysis of Ship Maneuvering Model, International Conference on Applied Mathematical Models ICAMM 2014, PSG College of Technology, Coimbatore, January 3 - 5, 2014.
26. A K Dash, V Nagarajan, Perturbation Stability Analysis of Nonlinear Mathematical Model, 58th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM 2013) An International Conference, BESU, Kolkata, December 18 - 21, 2013.
27. A V Saj, O P Sha, V Nagarajan,, An Investigation Towards Analysing Maneuvering Performance of KVLCC2 Vessel using CFD, ICSOT 2013: Technical Innovation in Shipbuilding, IIT Kharagpur, 12-13 December, 2013.
28. O. P. Sha, S. Paliencar, N. Vishwanath and S. C. Misra, Feasibility study and design of shallow draft ore carriers for Inland Waterways, First International Conference IDS2013 - Amazonia 17th - 19th July 2013, Iquitos, Peru.
29. A K Dash, V Nagarajan, O P Sha, Uncertainty analysis for ship maneuvering in model scale and full scale measurements, Tech Samudra 2012: International Conference Cum Exhibition on Technology of the Sea, Technology for Sustainable Maritime Activity, p. 22, December 2012, Indian Maritime University, Visakhapatnam, India.
30. S Suman, V Nagarajan, O P Sha, S Khanfir, E Kobayashi, Adi Maimun bin Abdul Malik, Ship Collision Risk Assessment Using AIS Data, Tech Samudra 2012: International Conference Cum Exhibition on Technology of the Sea, Technology for Sustainable Maritime Activity, p. 22, December 2012, Indian Maritime University, Visakhapatnam, India.
31. P Dilip Reddy, V Nagarajan, O P Sha, Nonlinear motion stability analysis for a high-speed container ship, MARSIM Conference 2012, 23rd ~ 27th April, Singapore.
32. S. Khanfir, K. Hasegawa, E. Kobayashi and V. Nagarajan: Mathematical Model for Manoeuvring of Twin-propeller Twin-rudder Ship Considering Peculiar Rudder Normal Force Phenomenon, Proc. MARSIM 2012, Singapore, Apr. 23 - 27, 2012.
33. A K Dash, V Nagarajan, Ship maneuvering: a review of past and present developments, International Conference on Ship & Offshore Technology - India

- 2011, Technological Innovation in Shipbuilding (ICSOT-2011), December 8-9, 2011, Department of Ocean Engineering & Naval Architecture, Indian Institute of Technology Kharagpur, India.
34. R S Dixit, V Nagarajan, An investigation into the maneuvering performance of ships in shallow navigation canal. International Conference on Mathematical Modelling and applications to industrial problems (MMIP 2011), March 28-31, 2011, National Institute of Technology Calicut, Kerala, India.
 35. V Nagarajan, S Khanfir, K Hasegawa, S K Lee. Single-propeller twin-rudder system - some design and operational aspects. In the proceedings of "INMARCO-INAvation 2010" conference, Mumbai, India, 9 ~ 11 December, 2010.
 36. S Khanfir, K Hasegawa, V Nagarajan, K Shouji, S K Lee, Twin-rudder systems - Rudder-hull interaction effect on the maneuverability of twin rudder ships. Report number 1-10, New Maneuvering Group meeting of Japan Towing Tank Conference (2010), Hiroshima University, Japan.
 37. S Khanfir, V Nagarajan, K Hasegawa, S K Lee, Estimation of mathematical model and its coefficients of ship manoeuvrability for a twin-propeller twin-rudder ship. MARSIM2009, Panama Canal Authority, Panama City, Panama, 17 - 20 August, 2009.
 38. V Nagarajan, Y Gonno, K Hasegawa, Assessment of maneuvering characteristics of a ship fitted with different rudder systems. ICOE 2009, IIT Madras, Chennai, India, 1 - 5 February, 2009.
 39. V Nagarajan, K Hasegawa, D H Kang, Maneuverability assessment of a pure car carrier (PCC) with Schilling rudder under strong wind. AMEC 2006, Jeju Island, S.Korea, 17 - 20 October, 2006.
 40. K Hasegawa, V Nagarajan, D H Kang, Performance evaluation of Schilling rudder and mariner rudder for pure car carriers (PCC) under wind condition. MARSIM2006, MIWB, Terschelling, The Netherlands, 26 - 29 June, 2006.