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Paper Title:

**INTRODUCTION OF RESEARCH ACTIVITY FOR HIGH-SPEED
PLANING CRAFT PERFORMANCE EVALUATION AT OSAKA
METROPOLITAN UNIVERSITY**

The performance of the high-speed planing craft is different from conventional displacement type vessels, and it has a significant relation with hydrodynamic forces acting on the craft as a result of its forward speed. Therefore, in order to estimate the performance of high-speed planing craft, it is significant to obtain the hydrodynamic forces accurately and to understand their characteristics. For the past thirty years, the research group of Osaka Metropolitan University (former Osaka Prefecture University) including the author has been investigating the performance estimation methods of high-speed planing craft in various areas among experimentally, theoretically and numerically. These areas include resistance, seakeeping, instabilities, maneuverability and propulsion. Katayama et al.

(2010, 2012, 2013) introduced the high-speed towing system (the maximum speed of which is 15m/s) developed to investigate the performance of high-speed planing craft at Osaka Prefecture University in 1994 and the experimental techniques and the analyzing procedures to evaluate the occurrence of dangerous motions which are longitudinal, transvers, directional instabilities and coupling motions induced by instabilities, the maneuverability and the resistance and propulsive performance. In this presentation, the evaluation method acceleration performance and the maneuverability and a free running model system which have been developed since 2013, and the results of investigations into the scale effect of hydrodynamic forces during straight forward steady running using CFD (Katayama et al.,2014, 2015, 2018, 2022a, 2022b) are introduced.

Katayama, T., Taniguchi, T., Habara, K. (2010), “Tank tests to estimate the onset of dynamic instabilities of high-speed planing craft”, Transactions - Society of Naval Architects and Marine Engineers, 118, pp.106-118.

Katayama, T., Ikeda, Y. (2012), “Development of Tank Test System for Performance Evaluation of High-Speed Planing Craft”, Conference proceedings, the Japan Society of Naval Architects and Ocean Engineers (15), pp.73-76 (in Japanese).

Katayama, T., Nishihara, Y., Sato, T. (2013), “A Study on the characteristics of self-propulsion factors of planing craft with outboard engine”, Transactions - Society of Naval Architects and Marine Engineers, 120, pp.133-143.

Katayama, T., Ohashi, S. (2014), “A Study on Spinout Phenomena of Planing Craft in High Speed Turning with Radio Control Small Model”, Proceedings of 14th International Ship Stability Workshop (ISSW2014), pp.249-253.

Katayama, T., Amano, R. (2015), “An Experimental Study on the Characteristics of Vertical Acceleration on Small High Speed Craft in Head Waves”, 12th International Conference on the Stability of Ships and Ocean Vehicles (STAB2015), pp.587-597.

Katayama, T., Adachi, T., Sawae, T. (2018), “Roll Damping Estimation for Small Planing Craft”, Proceedings of the 13th International Conference on the Stability of Ships and Ocean Vehicles (STAB 2018), pp.369-378.

Katayama, T., Kinugasa, M., Nannba, M. (2022a), “Development of Acceleration Simulation from Rest of Planing Craft with Outboard Engine by using Time History Input Data of Engine Torque”, 15th International Symposium on Practical Design of Ships and Other Floating Structures (PRADS).

Katayama, T., Yamaguchi, K., Nanami, T., Umeda, J., Ozeki, S., Soga, M., Watanabe, T. (2022b), “Calculation of Hydrodynamics Forces acting on Prismatic Planing Surface by CFD”, 15th International Symposium on Practical Design of Ships and Other Floating Structures (PRADS).

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Degree: Dr. Eng. (Mar, 1998, Osaka Prefecture University)
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Research history:

Apr, 2022 - Present: Professor, Graduate School of Engineering, Division of Aerospace and Marine-System Engineering, Osaka Metropolitan University

Apr, 2016 - Mar, 2022: Professor, Graduate School of Engineering, Division of Aerospace and Marine System Engineering, Osaka Prefecture University

Committee membership:

Jun, 2021 - Present: Member of the Executive Committee (Representative of Pacific Islands), International Towing Tank Conference (ITTC)

Sep, 2016 - Present: International Standing Committee, International Conference on Stability of Ship And Ocean Vehicles (STAB)

Selected Papers:

1. Toru Katayama, Tatsuki Nanami, Tomoki Taniguchi, Shohei Ozeki, Toshio Watanabe, "Study on Characteristics of Frictional Resistance of Prismatic Stepped Planing Surface and its Scale Effects by using a commercial CFD", Journal of the Japan Society of Naval Architects and Ocean Engineers, (39) 117-124, Jun, 2024 (Peer-reviewed).
2. Jun Umeda, Tomoki Taniguchi, Toru Katayama, "Experimental validation of data-driven reactive control strategy for wave energy converters: A Gaussian process regression approach", Ocean Engineering, 308, Sep 15, 2024 (Peer-reviewed).
3. Van Trieu Nguyen, Minh Duc Le, Van Minh Nguyen, Toru Katayama, Yoshiho Ikeda, "Influences of Gap Flow on Air Resistance Acting on a Large Container Ship", J. Mar. Sci. Eng. 2023, 11(1), 160, 2023 (Peer-reviewed).
4. Yusuke Yamamoto, Mizuki Kinugasa, Hiroki Morota, Toru Katayama, "Proposal for Motion Stabilized Platform of Doppler Lidar for Offshore Wind Observation and its Validation", Volume 4: Ocean Space Utilization, ASME 2023 42nd International Conference on Ocean, Offshore and Arctic Engineering, Jun 11, 2023 (Peer-reviewed).
5. Toru Katayama, Kohei Yamaguchi, Tatsuki Nanami, Jun Umeda, Shohei Ozeki, Masatsugu Soga, Toshio Watanabe, "Study on Scale Effects of Hydrodynamics around Prismatic Planing Surface by using CFD", Journal of the Japan Society of Naval Architects and Ocean Engineers, (36) 1-13, Dec, 2022 (Peer-reviewed).
6. Yusuke Yamamoto, Mizuki Kinugasa, Mayo Morita, Toru Katayama, "Proposal for Motion Stabilized Platform to equip Doppler Lidar for Offshore Wind Observations and its Control Method", Journal of the Japan Society of Naval Architects and Ocean Engineers, (36) 31-39, Dec, 2022 (Peer reviewed).

7. Yusuke Yamamoto, Toru Katayama, Taishi Morimoto, Tomoki Taniguchi, Hirotada Hashimoto, Masahiro Goto, “Mechanism of Inclination of Spar-Buoy with Ring-Fin Motion Stabilizer in Shallow Sea Caused by Tidal Currents and Waves and Avoidance of the Inclination”, Journal of the Japan Society of Naval Architects and Ocean Engineers, (33) 231-246, Jun, 2021 (Peer-reviewed).

8. Toru Katayama, Yasunori Takasaki, Toshiya Adachi, Mai Kankaku, Kei Sugimoto, Yusuke Fukumoto, “Characteristics of Roll Damping of Pure Car Carrier and Liquefied Natural Gas Carrier and applicability of Ikeda's Method”, Journal of the Japan Society of Naval Architects and Ocean Engineers, (31) 83-92, Jun, 2020 (Peer-reviewed).