

THE DYNAMIC POSITIONING OF FLOATING OFFSHORE VESSELS

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Abstract: The article surveys the dynamic positioning problem which emerged with appearance of floating offshore vessels. Among several other features, distinguishing offshore floating rigs from other traditional sea-going vessels and from ships in particular, the dynamic positioning is also one of such features not associated with previously known vessels. The main areas of dynamic positioning process and associated problem breakdown are indicated, each being a specific discipline requiring dedicated and more detailed survey.

Keywords – Oceans Floating Platforms, Dynamic positioning

References:

- [1] KRISTIĆ, V., Dinamičko pozicioniranje na otvorenom moru, uvodna riječ mentora za rad [1], (Materijal nije štampan u Zborniku)
- [2] KRISTIĆ, V., MANDŽUKA, S., Upravljanje brodom u režimu dinamičkog pozicioniranja, Brodarski institut, Zagreb, 1982.
- [3] MANDŽUKA, S., Dinamičko pozicioniranje plovniha objekata, upravljačka strategija; ETAN u pomorstvu, Zadar, 1983.
- [4] MORGAN, M., Dynamic positioning of offshore vessels, PBC Books Division, Tulsa, 1978.
- [5] ABRAHAMSEN, E, Semi-submersible offshore structures, aspects of design and quality control, Soc. Nav. Arch., Singapore, 3rd. Ann. Journal, 1975-1976.
- [6] DEN HOLM, J. M., Offshore drilling operations, Tran. I. Mar. E(TM), Vol. 94, Paper 26,1982.
- [7] Šilović, S., Plutajuća proizvodna postrojenja, Brodogradnja No. 2, Zagreb, 1982.
- [8] BRINK, A. W., STUURMAN, A. M., Automatic and manual control of the TRIPART/TE mine-hunter in the hower and trackkeeping modes - a preliminary design study, International Shipbuilding Progress, Vol. 26, No. 300,1979.
- [9] CARRAN, A., Propulsion control in the RSwn's M80 MCMVs, Maritime Defence, Nov. 1983.
- [10] THIENEN, K., Dynamische Positionierung fur universe lle Anwendung, Jahrbuch der Schiff-bautechnischen Gesellschaft, 1980.
- [11] SLUIJS, M. F., MINKENBERG, H. L., Ocean platforms, 14th International towing tank conference (ITTC), Ottawa, 1975.
- [12] FUJII, H., KASAI, H., On keeping of position for a lower-hull type semi-submersible platform, ibid.
- [13] KOŽUL, I., Pozicioniranje brodova i plovećih platformi na velikim dubinama, Mornarički glasnik, 5, Beograd, 1979.
- [14] McCLURE, A. C., Delos: An application of oil field marine technology to space programs, Marine Technology, Vol. 6, No. 2, 1969.
- [15] GRAHAM, J. R., JONES, K. M., KNORR, G.D., DIXON, T. F., Design and construction of the dynamically positioned glomar challenger, Marine Technology, Vol. 7, No. 2, 1970.
- [16] BOND, R., Dynamic positioning control system and operational experience, Trans. I. Mar. E.(C), Vol. 91, Conference No. 3,1979.
- [17] DAN FORTH, L., Environmental constraints on drill rig configurations, Marine Technology, Vol. 14, No. 3,1977.
- [18] JAMES, R., Ocean thermal structure forecasting, SP-105, Asweps manual, Vol. 5, US Naval Oceanographic Office, Washington
- [19] MICHEL, W. H., Sea spectra simplified, Marine Technology, Vol. 5, No. 1, 1968.
- [20] HATCHISON, B. L., BRINGLOE, J. T., Application of seakeeping analysis, Marine Technology, Vol. 15, No. 4, 1978.
- [21] JOURDAIN, G., SUSBIELLES, G., FAY, H., General survey of dynamic positioning, Institute Francais du Petrole, Zagreb, 1975.
- [22] ENGLISH, J., WISE, D., Hydrodynamic aspects of DP, Trans. North. East Coast Inst., Eng. Ship-building, 92,1976.
- [23] TRIANTAFYLLOU, M. S., A consistent hydrodynamic theory for moored and positioned vessels, Journal of Ship Research, Vol. 26, No. 2, 1982.
- [24] PERŠIĆ, R., Upravljalivost i upravljanje brodom, Sudostroenie, Leningrad, 1983.
- [25] SCHELLIN, M. T. E., Analyse von dynamisch positionierten, schimmenden Plattformen mit der nicht-linearen Zeitverlaufsmethode, Schiff und Hafen, Vol. 27, No. 5,1975.
- [26] MATSUMOTO, N., SUEMITSU, K., Experimental prediction methods of manoeuvring performance of ships and ocean structures, Nippon Kokan Technical Report, No. 32,1981.
- [27] CLARKE, D., The application of manoeuvring criteria in hull design using linear theory, The Naval Architect, March, 1983.
- [28] HIRANO, M., Manoeuvring motion prediction by computer in ship design - computer applications in the automation of shipyard, operation and ship design IV, IFIP, 1982.
- [29] BALL, A. E., BLUMBERG, J. M., Development of a dynamic ship positioning system, G EC, Vol. 42, No. 1,1975.
- [30] CALEY, M., Simulation of a dynamic positioning system for a semi-submersible vessel, GEC, Vol. 45, No. 3, 1979.
- [31] BROWN, N.A., NORTON, J.A., Thruster design for acoustic positioning systems, Marine Technology, Vol. 12, No. 2, 1975.
- [32] ŠILOVIĆ, S., Otpor i propulzija broda, Fakultet strojarstva i brodogradnje, Zagreb, 1968.
- [33] SWANSON, T. L., A generalized propulsion control logic, Oceans '82, 1982.
- [34] TAGGART, R, Simplified dynamic positioning controls for ships, Naval Engineers Journal, Vol. 83; No. 6,1971.

- [35] MARTI Ć, u., Višekriterijalno programiranje, Informator, Zagreb, 1978.
- [36] SAETTDS. JENSSEN, N., BALCHEN, J., Design and analysis of a dynamic positioning system based on Kalman filtering and optimal control, IEEE Transactions on automatic control, Vol. AC-28, No. 3, 1983.
- [37] J FUNG, P. T. K., GRIMBLE, M. J., Self-tuning control of ship positioning systems, IEE Workshop on Theory and Application of Adaptive and Self-Tuning Control, Oxford University, March, 1981.
- [38] FUNG, P. T. K., GRIMBLE, M. J., Dynamic ship positioning using a self-tuning Kalman filter, IEEE Transactions on automatic control, Vol. AC-28, No. 3, 1983.
- [39] GRIMBLE, M. J., PATTON, R. J., Use of Kalman filtering technique in dynamic ship positioning systems, IEE Proceedings, Vol. 127, No. 3, 1980.
- [40] KAZAKOV, I. E., Stohastička teorija sistema upravljanja, Nauka, Moskva, 1975.
- [41] Suvremene metode projektiranja sistema automatskog upravljanja, Mašinstroenie, Moskva, 1967.
- [42] KULJAČA, Lj. VUKIĆ, Z, Matematički modeli sistema automatskog vođenja broda po trajektoriji, ETF, Zavod za regulacionu i signalnu tehniku, Zagreb, 1976.
- [43] PETKOVSKI, Đ., Suvremene metode automatskog upravljanja složenim sistemima, Privredni pregled" Beograd, 1983.
- [44] MANDŽUKA, S., Konceptija dinamičkog pozicioniranja plovni objekata - struktura upravljačko-informacionog sistema, JUREMA, Zagreb, 1983.
- [45] KOROMAN, V., PATARIĆ, D., MANOŽUKA, S., Dinamičko pozicioniranje plovni objekata - upravljanje izvršnim organima, Simpozij in memoriam L. Sorta, Beograd, 1984.
- [46] KINSEY, M., Advances in control and monitoring systems, Maritime Defence, Nov. 1983.
- [47] WOODLIFF, G. E., A versatile microprocessor system for marine and offshore applications, Trans. T. Mar. E. (C), Vol. 95, No. 14, 1982.
- [48] LAJLIKOV, A. P., Čovjek, Elektronika, Brod, Sudostroenie, Leningrad, 1978.
- [49] FASTRING, R., WAPNER, M., An approach to an evolutionary implementation of shipboard distributed processing, Naval Engineers Journal, April, 1982.
- [50] WAPNER, M., Shipboard data multiplex system: a new concept for warship electronic system integration, Naval Engineers Journal, Vol. 91, No. 4, 1979.
- [51] ABRAHAM, D., Hardware and software modularity for shipboard systems, Naval Engineers Journal, Vol. 95, No. 3, 1983.
- [52] ANDREWS, P., VALLER, D. P., Multiplexing the interconnections of a ship systems, Navy International, Vol. 87, No. 8, 1982.
- [53] GREEN, D., HAMBLIN, A. J. C., Evaluation of microwave positioning systems, Trans. I. Mar. E. (C), Vol. 91, Conference No. 3, 1979.
- [54] MANDŽUKA, S., Dinamičko pozicioniranje plovni objekata - sistem za točno mjerenje pozicije, Brodarski institut, Zagreb, 1983.
- [55] MARRIOT, J., Position fixing for MCM vessels, Naval Force, Vol. 3, No. 1, 1982.
- [56] GAY, J., The role of navigation for the offshore petroleum industry, Sea Technology, March, 1983.
- [57] JERIĆ, V., Određivanje pozicije pri mjerenju plovni karakteristika broda, ETAN u pomorstvu, Zadar, 1983.