A New Software Platform for the Development and Testing of Dynamic Positioning Applications

openDP JIP

MARIN wants to stimulate the development and use of innovative ideas in dynamic positioning applications. We believe that the maritime industry could benefit from open technical discussions, cooperative research efforts and sharing of new developments. In the new joint industry project "openDP" a software platform for the development and testing of dynamic positioning applications will be made available to all project participants. This frame work consists of a complete time-domain simulation model of a vessel in wind, waves and current, combined with a generic DP system and thrusters. Users can focus on the development of their own control algorithms, without the need to worry about the correct modelling of the vessel behaviour.

MARIN has a long history in hydrodynamic research related to dynamic positioning, dynamic tracking and motion control. Since the 1970s, research efforts have been aimed at continuous development of tools and technology for DP model tests and calculations. Developments included scale model thrusters, control systems, Kalman filters, allocation algorithms and time-domain simulation models. MARIN is committed to continue these developments, in close co-operation with industry and research partners.

At present, not many tools are available for the development and testing of DP applications. Modelling and analysis tools for control systems do exist, but typically not in combination with a dedicated simulation model describing the vessel motion behaviour. MARIN is therefore taking the initiative to start the openDP JIP. The main objectives of the openDP JIP is to support development of innovative DP applications in complex operations at sea. Furthermore, we want to encourage discussion, co-operation and sharing of results.
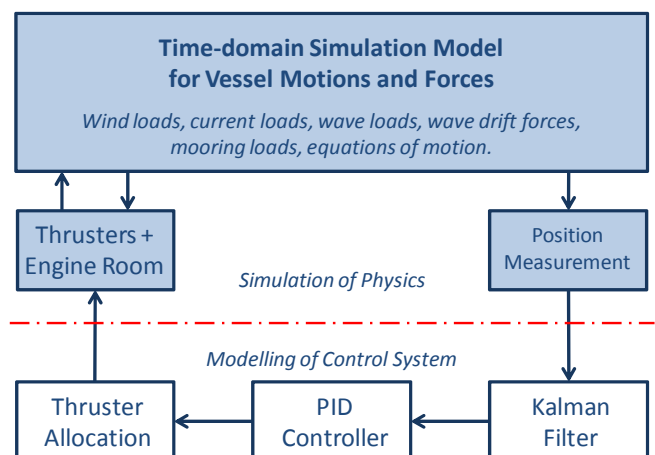
Objectives

To support the development of innovative DP applications in complex operations at sea.
To encourage discussion, co-operation and sharing of results.

In order to achieve this the open DP JIP will provide a software frame work for joint development of new technology for dynamic positioning applications, dynamic tracking and motion control.

Open Software Development Platform

In the openDP JIP a software frame work for development and testing of new technologies for dynamic positioning applications, dynamic tracking and motion control will be provided to the participants. The software framework consists of a time-domain simulation model for the vessel in wind, waves and current, combined with a generic DP system, as is shown in the figure below.

Time-domain Simulation Model for Vessel Motions and Forces — Wind loads, current loads, wave loads, wave drift forces, mooring loads, equations of motion. Thrusters + Engine Room. Position Measurement. Simulation of Physics. Modelling of Control System. Thruster Allocation. PID Controller. Kalman Filter.

User-defined software routines can be connected to the openDP frame work through a range of different communication protocols (e.g. NMEA, LUA script, Python, ..., etc.). This enables users to connect their own control algorithms and to investigate their performance in time-domain. Variables describing the state of the floater (e.g. motions and velocities) can be used as input signals, while thruster commands (e.g. RPMs and azimuth angles) can be send back to the time-domain simulation model. Users can replace the complete generic DP system by their own, or replace only a single component (e.g. the allocation algorithm, the PID controller, or the Kalman filter).

Development Areas

The areas of interest of the openDP JIP include components of the control systems, as well as their interaction with the vessel hydrodynamics. Examples of possible research topics are:

- Allocation algorithms
- Real-time filtering methods
- Advanced controllers
- Wave feed forward
- Multi-body DP
- Thruster modelling
- Power management strategies
- Fuel consumption

Participants

The openDP JIP aims at the following participants:

- Engineering companies
- DP manufacturers, thruster manufacturers
- Vessel operators, offshore contractors
- Dredging companies, drilling companies
- Ship-yards
- Universities

Deliverables

The JIP participants will receive the following deliverables:

- openDP software frame work
- Software interface, supporting multiple communication protocols
- Innovative DP solutions, as developed during the JIP

The openDP software frame work is made available at the start of the JIP. The frame work already includes several communication protocols, but additional protocols will be included during the JIP.

The research and development tasks will be defined and carried out by the JIP participants. At the end of the JIP, the results of developments made during the project will become available to all JIP participants. These results will remain confidential and exclusive for participants until 2 years after the end of the JIP.

Participant Fee & Schedule

The openDP initiative will start as a Joint Industry Project (JIP).

- Start date JIP   :   early 2016
- Duration   :   2 years
- Participant fee   :   EURO 25,000,= (indicative)
                             Exact fee will depend on the final scope of
                             work and number of participants.

Participant fees are excluding VAT. The payment of the participation fee can be divided over the duration of the project, in equal annual terms.

After the end of the openDP JIP research activities will continue in an openDP user-group, which will be part of the already existing aNySIM user-group. User-group members will pay an annual license fee to continue using of the openDP software frame work. Joining the user-group is optional; at the end of the JIP participants can also decide to continue their developments independently.

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More Information

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