

Title: Multi-vessel Cooperative DP Operations

Authors: André Ianagui, Alex Huang, Eduardo Aoun Tannuri, University of São Paulo

Abstract

As offshore operations grow larger and more complex, the requirements for a higher number of agents – from vessels to equipment – working simultaneously and cooperatively become evident. In this scenario, the ability to perform such tasks safely coordinating all these elements will eventually reach human limits, bounding also the complexity that can be achieved.

Enhanced levels of autonomy emerge as a response to these requirements, giving margin to safer, larger and possibly more cost effective operations. In this approach, DP vessels can be treated as “drone ships”, which can not only perform station keeping but also trajectory tracking tasks collectively. This work intends to propose a guidance and control method for use in multiple DP vessels to perform motion control of floating, unactuated loads connected through cables.

The idea consists in usage of a cooperative control structure, in which the vessels share its positions and efforts through a wireless network. A virtual leader is introduced and moved over the cargo required positions. Coordinated motions of the DP vessels in a rigid formation ensure the load is taken to its set-point. Simulation results for an illustrative case are presented and discussed.