

## **CFD applications for Ballast water management studies**

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### **Abstract:**

The method and application of Computational Fluid Dynamics (CFD) has progressed rapidly in the past fifty years in many industrial fields including marine and has been playing crucial & decisive roles. With the recent advancement in Marine CFD technology and in computational capability, practical applications of CFD in analyzing and predicting ship performance have picked up its' pace. Analysis such as prediction of ship resistance using CFD methodology is well validated and reliable results can be obtained using CFD. Detailed flow analyses is the major advantage of CFD which otherwise is very difficult to deal in experimental techniques as well as potential based solutions. Thus the problems involving highly turbulent and non-linear flows such as green water (shipped water on decks), slamming, sloshing, etc. are effectively dealt with globally utilizing CFD methodology in recent times.

Flow patterns and flow velocities can be predicted by CFD and these parameters can be used for dealing with the flow related issues which could be critical for design and operation of vessels. Moreover, these analyses are useful not only for prediction but solution of the problem and improving the performance as well.

In the present paper simulation of Ballast tank sedimentation with CFD is discussed. Flow mixed with solid particles (e.g. mud) causes the sedimentation over the time, typically in ballast tanks causing the species to be left in tank even after drawing out ballast water. Flow analysis is performed in order to study the flow pattern and the sediment formation. Possible solution towards design changes (after observing dead zones in tanks) is suggested. Also an introduction of CFD application for ballast water treatment processes is presented.