maneuverability. The Hiload requires a dedicated support vessel to assist the Hiload in idle periods and a specialized crew when in operation.

A system that addresses the above disadvantages is disclosed in US 5'803'779. A loading buoy in the form of a floating hull is provided with hawser lines, propulsion means and liquid transfer means to ensure safe liquid transfer operations at a predetermined distance from the offshore structure. However, the disclosed system is considered vulnerable to environmental induced movements such as roll, in particular during liquid transfer. In addition, the suitability for use as an effective means of transport is questionable.

There is therefore a need to mitigate the disadvantages with the existing systems and to further reduce the investments in extra equipment.

It is thus an object of the present invention to provide a method and a system that further improves the loading efficiency of conventional tankers, LNG carriers or other ships carrying fluids in open sea.

Summary of the invention:

The present invention is set forth and characterized in the main claims, while the dependent claims describe other characteristics of the invention.

In a first aspect, there is provided a transfer vessel for assisting offloading and transfer of fluid from an offshore production facility to a fluid carrying vessel in open sea comprising: - a transfer vessel hull having a first and a second outer longitudinal hull side; - a transfer vessel deck; - propulsion means for actively maintaining the transfer vessel at a predetermined safety distance from the offshore production facility and the fluid carrying vessel fluid carrying vessel during fluid transfer operations; and - fluid transfer means for transferring fluid between the offshore structure and the fluid carrying vessel at said predetermined safety distance, a discharge arrangement for discharging fluid to the fluid carrying vessel comprising at least one vessel discharge hose and a fluid coupling system situated in the transfer vessel forming a fluid communicating coupling between the loading arrangement and the discharge arrangement. The hull further comprises a main hull member and at least one protruding hull member arranged below the transfer vessels water line at each of the outer longitudinal hull sides for suppressing roll of the vessel. The at least one protruding hull member extends at least partly along the hulls longitudinal length, wherein one or both

of the ends of the at least one protruding hull member have an inclination angle exceeding 10^0 relative to a horizontal plane, and wherein said fluid transfer means comprises a side loading arrangement for receiving fluid from the offshore production facility comprising at least one loading manifold positioned at a side of the transfer vessel and configured to be connected to an end of at least one production facility loading hose.

In a second aspect, there is provided a method for transferring hydrocarbon containing fluid from an offshore production facility to a fluid carrying vessel for receiving and storing hydrocarbons via a transfer vessel in accordance with the first aspect and with any of the features described herein, wherein the method comprises the following steps:

a. transferring the end of the at least one vessel discharge hose to an assisting tug,
b. moving the assisting tug with the end of the vessel discharge hose to a position where the end of the vessel discharge hose may be connected to the tanker manifold,
c. connecting the end of the vessel discharge hose to the tanker manifold allowing the fluid to flow from the transfer vessel to a fluid tank within the fluid carrying vessel,
d. moving the transfer vessel to a position where at least one production facility loading hose may be transferred between the offshore production facility and the transfer vessel,
e. connecting the at least one production facility loading hose to the loading arrangement and
f. transferring desired amount of fluid between the offshore production facility and the fluid carrying vessel via the at least one production facility loading hose, the loading arrangement, the fluid coupling system and the discharge arrangement.

In yet another aspect, there is provided a transfer arrangement comprising an offshore production facility for producing hydrocarbons, at least one production facility loading hose situated on the offshore production facility, a fluid carrying vessel for receiving and storing hydrocarbons and a transfer vessel in accordance with the first aspect and with any of the features described herein, wherein the transfer arrangement further comprises an assisting tug for transferring an end of at least one vessel discharge hose from the transfer vessel to the tanker manifold on a fluid carrying vessel.

In one embodiment, there is provided a cargo transfer vessel for transferring fluid between an offshore production facility and a tanker. The cargo transfer vessel comprise a hull having a first and a second outer longitudinal hull side; a deck, propulsion means for actively maintaining the cargo transfer vessel at a predetermined distance from the offshore production facility and the tanker during fluid transfer operations and fluid transfer means for transferring fluid between the offshore structure and the tanker. The vessel is further characterized in that the hull comprises a main hull member and at least one protruding hull member arranged below the cargo transfer vessels water line at each of the outer longitudinal hull sides for suppressing roll of the vessel, wherein the at least one protruding hull member extends at least partly along the hulls longitudinal length, i.e. from the start of the vessel's bow to the end of the vessel's stern. The protruding hull member preferably extends between 10 % and 90 % of the longitudinal length, more preferably between 20 % and 80 % of the longitudinal length, even more preferably between 30 % and 70 % of the longitudinal length, even

member may for example be the part situated between of the protrusion ends. Furthermore, one or both of the protrusion ends may have an inclination angle exceeding 10° relative to the horizontal plane. The horizontal plane is defined as the plane oriented parallel to the water surface after vessel submersion.

In another advantageous embodiment the main part of the cargo transfer vessel's bottom is flat.

In another advantageous embodiment the fluid transfer means comprises a loading arrangement, preferably situated at the bow part of the vessel, for receiving fluid from the offshore structure comprising a loading manifold configured to be connected to an end of at least one production facility loading hose, a discharge arrangement, preferably situated at the stern part or midship part of the vessel, for discharging fluid to the tanker, comprising at least one vessel discharge hose and a fluid coupling system situated in the cargo transfer vessel forming a fluid communicating coupling between the loading arrangement and the discharge arrangement.

In one embodiment, there is provided a method for transferring hydrocarbon containing fluid from an offshore production facility to a tanker via a cargo transfer vessel. The vessel comprises a floating hull having a first and a second outer longitudinal side, a deck, a loading arrangement for receiving fluid from the offshore structure including a loading manifold, a discharge arrangement for transferring fluid to the tanker including at least one vessel discharge hose, and a fluid coupling system situated in the cargo transfer vessel forming a fluid communicating coupling between the loading arrangement and the discharge arrangement.

The method comprises the following steps:

a. transferring an end of the vessel discharge hose from the cargo transfer vessel to the tanker manifold,
b. connecting the end of the vessel discharge hose to the tanker manifold, allowing the fluid to flow from the cargo transfer vessel to a fluid tank within the tanker,
c. moving the cargo transfer vessel to a position where at least one production facility loading hose may be transferred between the offshore production facility and the cargo transfer vessel, for example by means of a production facility messenger line,
d. connecting the at least one production facility loading hose to the loading arrangement and

In another advantageous embodiment the method comprises the additional step of

- controlling the position of the cargo transfer vessel by means of dynamic positioning means.

In another advantageous embodiment the method comprises the additional step of

- controlling the flow rate between the offshore production facility and the tanker by means of at least one booster pump during step e.

In another advantageous embodiment the cargo transfer vessel is in accordance with any one of features mentioned previously.

In one embodiment, there is provided a transfer arrangement for transferring hydrocarbon containing fluid from an offshore production facility to a tanker. The transfer arrangement comprises an offshore production facility for producing hydrocarbons, a tanker for receiving and storing hydrocarbons and a transfer vessel in accordance with any of the features mentioned previously. The transfer arrangement may advantageously also comprise an assisting tug suitable for transferring an end of at least one vessel discharge hose from the cargo transfer vessel to the tanker manifold on the tanker and/or suitable for adding a pulling force on the second end of the tanker, the pulling force being directed away from the offshore production facility, and at least one production facility loading hose suitable for connection between the offshore production facility and the cargo transfer vessel.

Normally a conventional tanker is requiring assistance from tugs and transfer vessels. As apparent from the above description and the claims, the invention offers a solution in which the transfer vessels include equipment allowing a tanker to approach and unload a floating production unit or terminal. Preferably the transfer vessel should be equipped with a dynamic positioning system (DP) allowing the transfer vessel to keep the position relative to the floating production terminal while the tanker weathervanes from the stern of the transfer vessel.

In the following description, numerous specific details are introduced to provide a thorough understanding of embodiments of the claimed vessel and method. One skilled in the relevant art, however, will recognize that these embodiments can be practiced without one or more of the specific details, or with other components, systems, etc. In other instances, well-known