reduction of noise from the propeller through reduction of fluctuating pressure induced by the propeller and can achieve reduction of frictional resistance in a harsh marine environment.

SUMMARY

[0008] It is an object of the present invention to provide an air lubrication system for ships, which has an optimal arrangement of multiple air lubrication devices and thus can achieve improvement in operation efficiency of a propeller and reduction of noise from the propeller through reduction in fluctuating pressure induced by the propeller while allowing reduction of frictional resistance in a harsh marine environment.

[0009] It is another object of the present invention to provide an air lubrication method for ships using an air lubrication system for generating air bubbles on a ship bottom, wherein the air lubrication method provides an optimal arrangement of multiple air lubrication devices and thus can achieve improvement in operation efficiency of a propeller and reduction of noise from the propeller through reduction in fluctuating pressure induced by the propeller while allowing reduction of frictional resistance in a harsh marine environment.

[0010] In accordance with one aspect of the present invention, an air lubrication system for ships adapted to generate air bubbles on a ship bottom includes: a front air ejection port disposed in a bow region of a ship; and a rear air ejection port disposed at the rear of the front air ejection port in the bow region of the ship, wherein the front air ejection port and the rear air ejection port extend predetermined lengths, respectively, in a transverse direction of the ship, a region in which the front air ejection port is disposed and a region in which the rear air ejection port is disposed share an overlapping area in a longitudinal direction of the ship, a starting point of the air layer formed by air ejected through the rear air ejection port has a width of 0.5B or less, assuming a width of the ship is B, and the region in which the front air ejection port is disposed is 0.2 to 0.6 times of the region in which the rear air ejection port is disposed.

[0010a] In accordance with a second aspect of the present invention, there is provided an air lubrication method for ships using an air lubrication system for generating air bubbles on a ship bottom, the method comprising: ejecting air through a front air ejection port disposed in a bow region of a ship and a rear air ejection port disposed at the rear of the front air ejection port in the bow region of the ship, wherein an air layer formed by air ejected through the front air ejection port is incorporated into an air layer formed by air ejected from the rear air ejection port to increase the volume fraction of air in an air layer formed in a central region of the ship extending in a longitudinal direction of the ship, a starting point of the air layer formed by air ejected through the rear air ejection port has a width of 0.5B or less, assuming a width of the ship is B, and the region in which the front air ejection port is disposed is 0.2 to 0.6 times of the region in which the rear air ejection port is disposed.

[0011] According to embodiments of the present invention, the air lubrication system can improve operation efficiency of a propeller through reduction in fluctuating pressure induced by the propeller.

[0012] In addition, according to embodiments of the present invention, the air lubrication system can reduce noise from the propeller.

What is claimed is:

1. An air lubrication system for ships adapted to generate air bubbles on a ship bottom, the air lubrication system comprising:

a front air ejection port disposed in a bow region of a ship; and

a rear air ejection port disposed at the rear of the front air ejection port in the bow region of the ship,

wherein the front air ejection port and the rear air ejection port extend predetermined lengths, respectively, in a transverse direction of the ship,

a region in which the front air ejection port is disposed and a region in which the rear air ejection port is disposed share an overlapping area in a longitudinal direction of the ship,

a starting point of the air layer formed by air ejected through the rear air ejection port has a width of 0.5B or less, assuming a width of the ship is B, and

the region in which the front air ejection port is disposed is 0.2 to 0.6 times of the region in which the rear air ejection port is disposed.

2. The air lubrication system according to claim 1, wherein, when viewed in the longitudinal direction of the ship, the region in which the front air ejection port is disposed is present in the region in which the rear air ejection port is disposed.

3. The air lubrication system according to claim 2, wherein a center of the front air ejection port and a center of the rear air ejection port are located on a common line in the longitudinal direction of the ship.

4. The air lubrication system according to claim 3, wherein the common line is a longitudinal center line of the ship with reference to a thickness-wise center of the ship.

5. The air lubrication system according to claim 1, wherein, assuming a stern is 0 LOA and a bow is 1.0 LOA with reference to the overall length of the ship, the rear air ejection port is separated a distance of 0.1 LOA or less from the front air ejection port.

6. The air lubrication system according to claim 5, wherein the front air ejection port is disposed between 0.7 LOA and 0.85 LOA.

7. An air lubrication method for ships using an air lubrication system for generating air bubbles on a ship bottom, the method comprising: ejecting air through a front air ejection port disposed in a bow region of a ship and a rear air ejection port disposed at the rear of the front air ejection port in the bow region of the ship, wherein an air layer formed by air ejected through the front air ejection port is incorporated into an air layer formed by air ejected from the rear air ejection port to increase the volume fraction of air in an air layer formed in a central region of the ship extending in a longitudinal direction of the ship, a starting point of the air layer formed by air ejected through the rear air ejection port has a width of 0.5B or less, assuming a width of the ship is B, and
the region in which the front air ejection port is disposed is 0.2 to 0.6 times of the region in which the rear air ejection port is disposed.

8. The air lubrication method according to claim 7, wherein a center of the front air ejection port and a center of the rear air ejection port are located on a longitudinal center line of the ship with reference to a thickness-wise center of the ship to increase the volume fraction of air in the air layer formed in the central region of the ship extending in the longitudinal direction of the ship.

9. The air lubrication method according to claim 8, wherein:

the rear air ejection port is separated a distance of 0.1 LOA or less from the front air ejection port; and

a starting point of the air layer formed by air ejected through the front air ejection port is located between 0.7 LOA and 0.85 LOA, assuming a stern is 0 LOA and a bow is 1.0 LOA with reference to the overall length of the ship.