

Eugene Suprun

A. O. Siomin research supervisor

O. V. Khazova language advisor

State HEI “National Mining University” Dnipro (Ukraine)

Energy-saving and eco-friendly innovation for shipping

Being one of the most ancient ways of transporting goods and resources, sea shipping serves approximately 80% of the world trade market and successfully competes with the other ways of delivering goods. However, with fuel prices rising, popularization of “eco way of life” and increasing pressure to make industry greener, shipping companies are now suggesting new technologies that could help them to reduce carbon emissions and fuel consumption in order to make the marine industry more efficient and eco-friendly. As a rule, there are two ways of improving any kind of technology: the simple and the complex one. The first represents solutions that, at the first sight, seem to be silly and inefficient, but more detailed analysis proves them to be successful. The second variant proposes expensive innovations. However, Air Lubrication Technology (ALT) is a mixture of these two ways: on the one hand, what can be simpler than applying the Archimedes force, especially in shipping, but on the other hand, there is another question how to use it correctly.

ALT work is based on the principle of trapping a layer of air bubbles beneath the ship's hull. A special system is used to generate air bubbles to pass them continuously beneath the ship's surface. Air bubble outlets are created at different locations along the bottom of the hull, symmetrically on both sides of the ship's center line. Also, the system has to control the amount of the lost air bubbles to ensure that a uniform layer of air bubbles is maintained beneath the ship and the desired effect is produced. So, the technology is simple and complex at the same time. The Mitsubishi corporation believes that ships equipped with this system will achieve an energy-saving effect of more than 10% and will offer reduction in CO₂ emission up to 35%. Silverstream Technologies company claims that ship's velocity will increase drastically.

However, several disadvantages create the barriers for the wide use of this technology. First of all, it is necessary to develop a reliable software controlling numerous microparameters. For instance, to obtain the desired effect, it is important that air bubbles are of uniform size and are evenly distributed beneath the hull surface, otherwise a change in the diameter would affect the bubble distribution beneath the hull. Another problem is that ALT can be used only for certain types of ships with flat bottoms and cannot be used in rough seas. Moreover, air cavities made for trapping the air bubbles could affect the handling and stability of the ship in the sea. Though ALS is realistic and perspective technology which can benefit both the economy and ecology, the problems mentioned require further research and improvement.