A hot body could help ships reduce drag

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New research into drag reduction has the potential to help industries such shipping to reduce energy use and carbon emissions.

Professor Derek Chan from the University of Melbourne's Department of Mathematics and Statistics said the research demonstrates a new way to minimise drag of fast moving projectiles in water.

A collaboration between the University of Melbourne and the King Abdulla University of Science and Technology in Saudi Arabia, the research was based on the 255 year-old Leidenfrost effect.

The Leidenfrost effect describes the phenomenon where a liquid produces an insulating vapour layer when it comes in contact with a solid surface that is hotter than its boiling point.

The new research used high-speed video footage to assess the drag produced from polished balls dropped into liquid. The results found that the drag on the ball is reduced to almost the minimum possible through the creating of an insulating vapour as it falls through the liquid.

Professor Chan said that the new drag reduction method has the potential to reduce energy costs for a broad range of applications, such as ocean transport and high-pressure pumping of liquid through pipelines.

"An obvious area of application is shipping," he said.

"Australia transports a large amount of products such as iron ore and grain around the world. The ship's hot body could substantially minimise the amount of drag as it passes through water, therefore potentially reducing transportation costs and greenhouse gas emissions."

"There are still a number of issues that need to be addressed before this drag reduction method can be applied commercially, such as the effect of increased heat on issues such as corrosion," he said.

The paper was published as a research highlight in Nature Physics today, and in full by the Physical Review Letters, a peer-reviewed scientific journal published by the American Physical Society.

The University of Melbourne and the King Abdulla University are now writing a follow-up theory paper. While the first paper demonstrated that the drag reduction method is real and achievable, the follow-up paper will provide detailed theoretical analysis of the research.

Provided by University of Melbourne