Avengers-style Helicarrier is still pie in the sky

June 28 2013

(Phys.org) —One of the most impressive features of last year's blockbuster smash The Avengers was a gigantic flying aircraft carrier powered by four immense propellers.

But could the four-propeller "helicarrier" – owned by Marvel comics' spy agency S.H.I.E.L.D – actually work in reality?

According to University of Leicester physics students, the answer is no – as we currently cannot make propellers capable of spinning fast enough to hold the 1,900 ft vehicle aloft with only four sets of blades.

The group of fourth year MPhys students published their findings in a paper entitled Helicarrier: Highly Feasible or Hollywood Hijinks? in the latest volume of the University of Leicester's *Journal of Physics Special Topics*.

The journal is published every year, and features original short papers written by students in the final year of their four-year Master of Physics degree.

The students are encouraged to be imaginative with their topics, and the aim is for them to learn about aspects of publishing and peer review.

Marvel Comics' intelligence agency S.H.I.E.L.D uses the Helicarrier as its airborne headquarters.

In the 2012 film, S.H.I.E.L.D agent Nick Fury and superheroes Hulk, Iron Man, Captain America and Thor board the Helicarrier as they try to track down the powerful Tesseract device.

The students found that an object the size of the Helicarrier would need to propel its four sets of 30 metre blades at 324 rotations per minute to keep its huge mass – estimated at 400 million kilograms - in the sky.

This is faster than the maximum speeds achieved by propellers on modern helicopters. Helicopters with 16.5 metre propeller blades rotating at maximum engine power are only capable of reaching speeds of 258 rotations per minute.

As a result, the Helicarrier would struggle to keep afloat with the mere four propellers shown in the film – especially as one of the propellers is blown up by Hawkeye during an explosive fight scene.

The group consisted of final year MPhys students Ashley Clark, 22, Beaconsfield, Buckinghamshire, Kate Houghton, 22, from Sidcup, London, Jacek Kuzemczak, 22, from Lincolnshire and Henry Simms, 22, from Milton Keynes, Buckinghamshire.

Kate Houghton, the lead author of the article, said: "To make the Helicarrier more feasible, several sets of smaller blades would be required. It is also likely that conventional engines used today would need to be redesigned to be more powerful and efficient. Another option would be to reduce the Helicarrier in size, since fewer small, less powerful propellers would be required.

"New films today often use special effects and contain far-fetched, futuristic machines. We found it very interesting to investigate the possibility of some of these vehicles becoming a reality in the future. It was also an excellent excuse for a film night!"

Henry Simms said: "The *Journals of Special Topics* module was different to most of the other modules because we were able to choose what topics we researched and investigated. We enjoyed working in groups, writing a series of short articles and reviewing each other's work because it gave us a great insight into how the scientific community works together to publish scientific papers.

"The module improved our ability to work as a team - and having to come with original ideas provided us with a new challenge. It was a great experience, as skills learned through this course will help anybody like myself pursuing a PhD and scientific research."

Course leader Dr Mervyn Roy, a lecturer at the University's Department of Physics and Astronomy, said: "A lot of the papers published in the Journal are on subjects that are amusing, topical, or a bit off-the-wall. Our fourth years are nothing if not creative!

"But, to be a research physicist - in industry or academia - you need to show some imagination, to think outside the box, and this is certainly something that the module allows our students to practice.

"Most of our masters students hope to go on to careers in research where a lot of their time will be taken up with scientific publishing - writing and submitting papers, and writing and responding to referee reports.

"This is another area where the module really helps. Because *Physics Special Topics* is run exactly like a professional journal, the students get the chance to develop all the skills they will need when dealing with high profile journals like *Nature* or *Science* later on in life."

More information: Clark, A. et al. Helicarrier: Highly Feasible or Hollywood Hijinks? *Journal of Physics Special Topics*. physics.le.ac.uk/journals/inde … article/view/518/399

Provided by University of Leicester

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