(whether it be saved lives, saved money or improved ecology), then the development of autonomous vehicles will worth all funds invested in it.

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THERMONUCLEAR ENGINES IN ROCKET SCIENCE

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Key words: thermonuclear engines, rocket, plasma, interstellar

Introduction. Today, most rocket engines use chemical reactions to create reactive thrust. But there are more efficient rocket engine concepts. The most promising of them is a thermonuclear engine. The idea of creating such an engine appeared in the 1960s, but the model was created only 10 years ago. Thermonuclear reactors themselves are very loud because of generating hundreds of megawatts of energy. Nowadays scientists are working on creating weaker and correspondingly more compact reactors that can be installed on the rocket board.

Objectives. The main task is to describe why the use of thermonuclear engines will lead to more efficient space flight and identify its shortcomings.

Methods. Thermonuclear plasma heated to millions of degrees is the fuel in a thermonuclear engine. The design of such an engine is not only much more efficient but also capable of generating a lot of power that can be used for various purposes. In order to obtain plasma, a mixture of deuterium and helium-3 is heated using low-frequency radio waves, and then held in a ring using a magnetic field. Releasing the plasma through a rocket nozzle with an exhaust velocity of 25,000 km/s sets the rocket in motion.

Results. Potential of this engine could create a very fast spacecraft. With today's technology, a flight to Mars would take about two years, but if you used 6 rockets with thermonuclear engines, it would take 310 days. Thus, the amount of food, water and other materials used by the astronauts in the rockets with thermonuclear engines is reduced. Also, do not forget about the time spent in space. It is also worth mentioning that space radiation is one of the biggest problems why human beings have not flown to Mars yet.

The main disadvantage of a thermonuclear engine is that the radio waves do not penetrate deep into the plasma, so designers will have to use several engines at the same time. Another disadvantage is that helium-3 is quite rare on Earth.

Conclusion. The intensive development of rocket science is attracting more and more attention. The creation of thermonuclear engines will take rocket science to a new level and will make longer flights possible. In the future, the use of rockets with thermonuclear engine could even enable an interstellar voyage to the nearest star system, Alpha Centauri.

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NEW RADIOSTATION FORMAT

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Key words: radio, transmitter, FM, DAB, 3G, LTE, power

Introduction. Everyone knows that FM radio has amazing advantages: it is free, it does not require your personal data, it uses a small amount of energy compared to LTE and Wi-Fi transmitters. Due to low frequency FM waves bypass thousands of obstacles and reach very far distances (usually ~70-90 km). For instance, 1kW FM transmitter can produce a wave which reaches 50 km radius while 1 kW LTE transmitter wave barely expands to 2 km radius. Everyone knows the "problem of 10 radio stations": the frequency resource $87{,}5*10^6$ Hz – $108*10^6$ Hz is very limited and the number of radio stations is often insufficiently small. This problem has become a source why modern society withdraw FM radio.

Objectives. The objective of this work is how to increase the frequency diapason and give radio a life in the future. Some people argue that the best and the most universal method is broadcasting via internet, but there is a huge problem: loss of internet just for one second causes complete reception interruption of stream and a radio receiver should be restarted manually. Nowadays the internet coverage does not allow us to use this format. That is why DAB is presented.

Methods. The method proposes to use another and enough modern transmitting format. This is Digital audio radio service. Its standards may provide terrestrial or satellite radio service, while FM radio can be transmitted only in terrestrial way. Digital radio broadcasting systems are low in power consumption and designed for handheld devices, while other digital TV satellite systems typically require a huge fixed directional antenna. It means DAB can be substitute FM radio in all devices, from mobile phones to portative speakers. It seems to be great, but in practice we face some problems:

ENGINEERING INNOVATIONS