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ACTIVE STABILIZATION SYSTEM OF THE STUDENT'S EXPERIMENTAL ROCKET

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The main engineering issue of this work is to improve flight performances of the student's experimental rocket.

To solve the main task the separate unit is being developed, this unit provides rocket stabilization during flight in automatic mode. Development includes rocket's aerodynamic behavior research from the experimental and analytical points of view, design of the test bed for electronic component testing of the unit. Development test allows to obtain more exact values of disturbing quantities necessary to model the processes taking place during rocket flight. After completing the modelling stage, authors are planning to design the first prototype of the active stabilization unit to carry out flight tests.

A lot of manufacturers all over the world are currently applying automation by means of microelectronic components with open source to improve process efficiency. In the frame of this work, the authors put emphasis on enhancing of active stabilization system autonomy using hardware for system generation Arduino and STM32.

This work presents analysis of the existing main task solutions – improvement of flight performances of the experimental rocket providing its optimal efficiency by means of stability manipulation. Advantages and disadvantages of the solutions have been given. Preliminary conclusions have been drawn that some drawbacks are to be considered and eliminated at the active stabilization system design stage.

Further work plan includes flight performance testing of the experimental rocket, its aerodynamic characteristics calculations, experimental and analytical simulation of rocket behavior in flight, automatic control development principle of the rocket, active stabilization unit designing.