

SPACE SYSTEMS SYMPOSIUM (D1)  
Interactive Presentations (IP)

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THE METHODOLOGY OF TIME-EFFICIENT ESTIMATION OF FLYING VEHICLE'S  
CHARACTERISTICS AT THE STAGE OF DRAFT DESIGN USING THE MULTI-DISCIPLINARY  
SOFTWARE**Abstract**

While designing a flying vehicle it is necessary to provide all the project participants with fast access to flight characteristics of current version of the product. This ensures process continuity and high level of communication between adjacent departments. The desire to get the most reliable data about the object which is still under development often comes in conflict with our wishes to decrease the time of vehicle's flight possibilities determination. Such conflict could be smoothed taking into account a potential of actual software tools. The combination of several software kits which are united by the logic of consecutive application gives an opportunity to obtain the scheme of vehicle's configuration and properties permanent precision. The time-efficiency of connected intermediate task solution depends on availability of computational capabilities which should be sufficient enough to carry out calculations based on concrete initial conditions within several hours. Speaking about the motion parameters determination using a computer one has to deal with iterations of multi-stage integration to comply with given boundary data. Moreover, it is required to know vehicle's aerodynamics which is usually obtained from the wind tunnel experiments which are extremely high-priced and of long duration. The authors have developed a methodology of complex utilization of available and self-dependent created special software; it allows the time and financial costs reduction during the vehicle's preliminary design. The advantage of the mentioned methodology is in its industrial and academic adaptability because it doesn't require experiments which are to be conducted using expensive equipment. The use of world-spread software for strength and fluid dynamics 3D calculations is assumed such as SolidWorks, Ansys, OpenFoam etc. Created methodology permits to receive vehicle's introductory flight characteristics before flight testing would have started. The special software kit developed in Mission Control Centre of Bauman University is described as an example; it can be used for flying vehicle's trajectory calculation in case of atmospheric and spatial motion.