
Improving cross-country ability, run smoothness and controllability of aircrafts and vehicles with controllable combined air-cushion undercarriage

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The article describes a developed method of selecting and optimizing parameters of combined chassis complex control algorithms and aerodynamic aircrafts elements. This method allows decreasing aircrafts dynamic load during running by rough runway and provides airplane stability and controllability during take-off and landing in the conditions of cross-wind and slope of the runway. Preliminary calculations and experimental researches of chassis with controllable pressure in sections of air-cushion indicate that accelerations of aircrafts with such kind of undercarriage and appropriate algorithms could be reduced by 1.8 times. It becomes possible to use for take-off and landing water surface, prepared and unprepared ground surfaces, soft soil flat country. It is shown, that the control of run direction during take-off and landing in conditions of cross-wind and slope of the runway should be realized by airplane turn on balancing angle of glide. Automation of control under these conditions allows reducing side deviation down to 2.5 meter. To predict energy efficiency of aircrafts and vehicles with air-cushion chassis in wide range of changeable parameters conditions developed and verified math model. This model allows creating and fine-tuning algorithms of dividing the power between wheeled propeller and air-cushion system to provide the most efficient mode of objects motion.

Keywords: driving dynamics, the system of differential equations, the mathematical model, the disturbance irregularities, management, depreciation hour.

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