

Application of special problems of system motion analysis in rotorcraft designing and testing analysis.

¹*Doctor of Science (Engineering) V.G. Gainytdinov,*

²*Doctor of Physics & Mathematics A.I. Golovanov,*

³*PHD (Engineering) E.V. Kasymov,*

³*PHD V.A. Shuvalov*

¹ Tupolev Kazan State Technical University

10 K. Marks St. Kazan 420111

e-mail: gainut@mail.ru

² Ulianov-Lenin Kazan State University

17 Universitetsky St. Kazan 420008

³ JSC "Kazan Helicopter plant"

14 Tacsovsky St. Kazan 420045

e-mail: ev_kas@rambler.ru

Vshuvalov@kazanhelicopters.com

Component simulation of forthcoming bench and flight testing on the stage of flying vehicle designing allows to increase efficiency of full-scale test as well as to define optimal design parameters more precisely.

Application of numerical methodology in helicopter designing requires unification of several groups of complex problems (growing capacities of the COMPUTER is taken into account). Some of them are the following:

- the problems of aerodynamic load determination at subsonic and supersonic flow;
- the problems of statics (as a special case of dynamic system motion problems) on determination of design components intense condition at big and small displacement;
- the problems of complex dynamic system motion taking into account physical properties of it's components;
- the problems of optimal design parameters research.

The methods of design analysis of mechanical systems are considered in this paper. The methods suggested are based on the unification of several groups of numerical design problems while solving the problems of statics and mechanical system motion under the influence of external forces. Analysis of constructions made of composite materials, light rotorcraft control system mechanisms are given as examples. Opportunities of application of nonlinear-problems solution at the early stages of flying vehicles design are considered.

Construction of the algorithms of design problems solution is based on the mixed application of calculation software of Russian and foreign developments.

Data on Scientists

Vladimir Grigorevich Gainytdinov, Doctor of Science (Engineering), Chairman of Flying vehicles constructing & designing department of A.N.Tupolev KSTU, phone/fax: 236-62-93, e-mail: gainut@mail.ru;

Eugenie Vladimirovich Kasymov, Chief of JSC “KHP” bureau, phone/fax: 549-66-97, e-mail: ev_kas@rambler.ru;

Alexander Ivanovich Golovanov, Doctor of Physics & Mathematics, Pro-rector on scientific work of KSU;

Vladimir Alexandrovich Shuvalov, PHD, Vice Chief Designer of JSC “KHP”, phone: 549-69-51, e-mail: Vshuvalov@kazanhelicopters.com