
**Processing algorithm of the forces and moments measured
by multicomponent tensives on a model of objects
with air-cushion undercarriage when tested in altitude tunnel
on a dynamic installation near the screen**

© V.N. Naumov², K.V. Rarpenko¹, Yu.Yu.Merzlikin¹, A.S. Menshikov¹

¹ Central Aerohydrodynamic Institute, NIMK TsAGI, Moscow, 105005, Russia

² Bauman Moscow State Technical University, Moscow, 105005, Russia

We propose a method of load-sharing which affects in a stream of the altitude tunnel on the large-scale models of aircraft with air-cushion undercarriage during experiments carried out on the screen when the models were vibrating on dynamic bench, measuring height, roll, pitch and yaw. We share loads on the groups of external forces and moments: aerodynamic ones, on the main engine of the power plant, the input pulse in the fan of discharge apparatus, of the air cushion, elements of flexible fence when contacting with the surface of the runway. The loads of the model are measured using multicomponent tensives. The division of the loads on the components allows to choose optimal parameters of aircraft elements. The processing algorithm of the tensively measured forces and moments eliminates interference of indication channels of tensives from each other and identifies all major components of the steady and unsteady aerodynamic derivatives required for the formation of the mathematical model of stability and controllability of these objects in different modes of their movement.

Keywords: *coefficient of forces, coefficient of moments, experimental set-up, significant complexes of derivatives, harmonic vibrations of the model.*

REFERENCES

- [1] Dolgoplov A.A., Wisniewski G.A., Merzlikin Yu.Yu. Osobennosti metodiki tekhnicheskikh spedstv dlya experimentalnogo opredeleniya statsionarnykh i nestatsionarnykh aerodinamicheskikh kharakteristik letatelnykh apparatov s vzletno-posadochnymi ustroystvami na vozdushnoy podushke [Features of methods of technical means for the experimental determination of the steady and unsteady aerodynamic characteristics of the aircraft with the take-off and landing devices on the air-cushion]. *Sbornik dokladov Vnauchnoy konferentsii po gidroaviatsii "Gidroaviasalon-2000"* [Reports at III Scientific Conference on Hydroaviation "Gidroaviasalon'2000"]. Moscow, TsAGI Publ., 2000, 296 p.
 - [2] Begovschits V.N., Kolinko K.A., Biatov O.L., Khrabrov A.N. Ispolzovanie metoda lineinoi peggessii dlya obrabotki dannykh nestatsionarnogo aerodinamicheskogo experimenta [Using the method of linear regression for the data of unsteady aerodynamic experiment]. *Uchenye Zapiski TsAGI — TsAGI Science Journal*, 1996, vol. XVIII, no. 3–4, p. 30–38.
 - [3] Belotserkovsky S.M., Skripach B.K., Tabachnikov V.G. *Krylo v nestatsionarnom potoke gaza* [The Wing in unsteady gas flow]. Moscow, Nauka Publ., 1971, 767 p.
 - [4] Vlasov A.N., Dubov Yu.B., Studnev R.V., Shibaev V.M. Ispolzovanie nestatsionarnykh aerodinamicheskikh proizvodnykh v uravneniyakh bokovogo dvizheniya samoleta [The Use of unsteady aerodynamic derivatives in the equations
-

of lateral motion of the aircraft]. *Trudy TsAGI — TsAGI Works*, 1984, iss. 2333, p. 17–36.

- [5] Kulyavtsev V.P., Tabachnikov V.G. Otsenka nagruzok, deistvuyuschikh na modeli samoleta, prirazlichnykh vidakh dvizheniya [The Assessment of the loads acting on the aircraft, if different types of movement]. *Trudy TsAGI — TsAGI Works*, 1985, iss. 2290, pp. 31–38.

Naumov V.N. (b. 1941) graduated from Bauman Moscow State Technical University in 1965. Dr. Sci. (Eng.), Professor, Honored Scientist of the Russian Federation. Head of the Tracked Vehicle and Mobile Robots Department at Bauman Moscow State Technical University. Author of 300 publications in the field of transport machinery.

e-mail: naumovvn@yandex.ru

Karpenkova L.V., senior engineer of the Department no. 2 at the Central Aerohydrodynamic Institute (TsAGI). Specialist in aircraft aerodynamics.

Merzlikin Yu.Yu., chief engineer in the Central Aerohydrodynamic Institute (TsAGI). Specialist in the field of stationary and nonstationary aerodynamics of aircraft.

e-mail: ymerzlikin@gmail.com

Menshikov A.S., an engineer of the Department no. 2 at the Central Aerohydrodynamic Institute (TsAGI). Specialist in aircraft aerodynamics.

e-mail: lyoshamenshikov@yandex.ru
