
The way to optimize a flight program of subsonic passenger aircraft at lowering and braking of the aircraft by considering operational constraints for civil aviation

© E.A. Gubareva, T.Yu. Mozzhorina

Bauman Moscow State Technical University, Moscow, 105005, Russia

Flight simulation is based on traditional approaches used for subsonic passenger aircrafts. Lowering and braking modes of operation are optimized by considering operational constraints for civil aviation. For simulating flight conditions we used the in-built model of bypass turbojet engine. It makes possible to calculate power plant parameters under any flight conditions.

Keywords: *flight simulation, modeling GTE, flight optimization program, passenger aircraft.*

REFERENCES

- [1] Yugov O.K., Selivanov O.D. *Osnovy integratsii samoleta i dvigatelya* [Fundamentals of aircraft and engine integration]. Moscow, Mashinostroenie Publ., 1989, 304 p.
 - [2] Byushgens G.S., ed. *Aerodinamika i dinamika poleta magistralnykh samoletov* [Aerodynamics and flight dynamics of long haul aircraft]. Moscow, TsAGI Publ., Beijing, PRC Aviaizdatelstvo Publ., 1995, 772 p.
 - [3] Shlyakhtenko S.M., ed. *Teoriya dvukhkonturnykh turboreaktivnykh dvigateley* [Theory of bypass turbojet engine]. Moscow, Mashinostroenie Publ., 1979.
 - [4] Yankin V.I. *Sistema program dlya rascheta kharakteristik VRD* [The system of programs for calculating the air-jet engine characteristics]. Moscow, Mashinostroenie Publ., 1976, 168 p.
 - [5] Skripnichenko S.Yu. *Optimizatsiya rezhimov nabora vysoty (ekonomicheskie rezhimy poleta)* [Optimization of the climb conditions (economic flight modes)]. Moscow, Mashinostroenie Publ., 1975, 191 p.
 - [6] Skripnichenko S.Yu. *Osnovnye napravleniya ekonomichnosti poleta grazhdanskikh samoletov* [Principal directions of civil aircraft economy flight]. *Aviatsiya i kosmonavtika–2003: Tezisy dokl. mezhdunar. nauch. konf.* [International Scientific Conference “Aviation and Cosmonautics’ 2003”. Abstracts]. Moscow, MAI Publ., 2003, pp. 74–75.
 - [7] Skripnichenko S.Yu. *Razvitie energeticheskogo metoda dlya optimizatsii rezhimov nabora vysoty i snizheniya* [The development of the energy method for optimization of climb and descent]. *Sovremennye problemy dinamiki poleta, aerodinamiki i letnykh ispytaniy. Sbornik dokladov Vserossiyskoy konferentsii* [Current Problems of Flight Dynamics, Aerodynamics and Flight Tests. Proceedings of the All-Russian Conference]. Moscow, MAI Publ., 2004, pp. 110–118.
 - [8] Skripnichenko S.Yu. *Nauchny Vestnik MGTU GA. Seria Aeromekhanika i prochnost – Scientific Herald of Moscow State Technical University of Civil Aviation. Series: Aeromechanics and Strength*, 2005, no. 81, pp. 107–110.
 - [9] Kiselev M.A., Kostin A.M., Tyumenev V.R. *Nauchny Vestnik MGTU GA – Scientific Herald of Moscow State Technical University of Civil Aviation*, 2008, no. 125, pp. 138–145.
-

-
- [10] Van Dierendock A.J. Practical Optimal flight control for aircraft with large flight envelopes. *AIAA Papers*, 1978, no. 73-159, 6 p.
- [11] Schultz R., Zagalsky N. Aircraft performance optimization. *Journal of Aircraft*, 1972, vol. 9, no. 2, 78 p.
- [12] Burrows J.W. Fuel optimal trajectory computation. *Journal of Aircraft*, 1972, vol. 19, no. 4, 64 p.
- [13] Gubareva E.A., Mozzhorina T.Yu. *Inzhenernyy zhurnal: nauka i innovatsii — Engineering Journal: Science and Innovation*, 2013, iss. 12. Available at: <http://engjournal.ru/catalog/mathmodel/aero/896.html>
- [14] Gubareva E.A., Mozzhorina T.Yu. *Matematicheskoe modelirovanie i chislennye metody — Mathematical Modeling and Computational Methods*, 2014, no. 3(3), pp. 74–88.
- [15] Gubareva E.A., Mozzhorina T.Yu. *Inzhenernyy zhurnal: nauka i innovatsii — Engineering Journal: Science and Innovation*, 2014, iss. 12. Available at: <http://engjournal.ru/articles/1248/1248.pdf>

Gubareva E.A. (b. 1982) graduated from Lomonosov Moscow State University in 2004. Cand. Sci. (Phys.-Math.), Assoc. Professor of the Computational Mathematics and Mathematical Physics Department at Bauman Moscow State Technical University. Author of over 40 scientific publications in the field of continuum mechanics, composite mechanics, asymptotic analysis, contact mechanics, flight dynamics of aircraft.
e-mail: gubareva_ea@pochta.ru

Mozzhorina T.Yu. (b. 1959) graduated from Moscow Aviation Institute in 1982. Cand. Sci. (Eng.), Assoc. Professor of the Computational Mathematics and Mathematical Physics Department at Bauman Moscow State Technical University. Author of 20 publications in the field of mathematical simulation of gas-turbine engine, mathematical simulations of a passenger aircraft flight, optimization of aircraft control system.
e-mail: mozzhorina@mail.ru
