

# Contents

---

## Vol. 53, No. 1, 2010

A simultaneous English language translation of this journal is available from Allerton Press, Inc.  
Distributed worldwide by Springer. *Russian Aeronautics (Iz. VUZ)*, ISSN 1068-7998.

---

### Flight Vehicle Design

Mathematical Model of Balancing for a Vertical Takeoff and Landing Disk-Wing Aircraft

*A. M. Girfanov and V. V. Pavlov*

1

### Structural Mechanics and Strength of Flight Vehicles

Simulation of Elastoplastic Deformation of Helicopter Skid Landing Gear Springs

*S. A. Mikhailov, L. V. Korotkov, and D. V. Nedel'ko*

9

Fatigue Life of a Plate with an Arbitrary-Shaped Concentrator under Low-Cycle Plane Loading

*A. T. Ponomarev, V. G. Stopkevich, and E. V. Korobeinikov*

16

---

### Flight Dynamics and Control of Flight Vehicles

Mathematical Modeling of an Optimal Controlled Helicopter Flight at Vertical Regimes

*A. G. Auzyak, V. I. Budin, and F. V. Dremov*

26

An Efficient Method for Determining a Distance at Direction Finding of Target with Partially-Known Parameters

*Yu. G. Bulychev, A. A. Mozol', and V. N. Vernigora*

33

---

### Aero- and Gas-Dynamics of Flight Vehicles and Their Engines

A Method for Determining Velocities and Accelerations of an Elastic Main Rotor Blade Element

*V. A. Leont'ev*

39

Influence of the Open End Geometry on Resonance Oscillations of a Gas in a Tube

*L. A. Tkachenko and R. G. Galiullin*

45

---

### Aircraft and Rocket Engine Design and Development

Choice of Support Arrangement in Designing Two-Support Rotors of Gas Turbine Engines

*V. A. Zrelov, A. S. Mironov, and M. E. Prodanov*

51

A Technique for Presentation and Application of the Propeller Fan Multidimensional Characteristics in Semi-Full-Scale Simulation of a Gas Turbine Engine and Its Automatic Control System

*I. A. Krivosheev, A. G. Godovanyuk, V. S. Fatikov, and G. I. Pogorelov*

57

Improvement of Conventional Combustion Chamber Structure in Order to Enhance GTE Ecological Indicators

*A. N. Markushin, V. K. Merkushin, V. M. Byshin, and A. V. Baklanov*

63

Investigation of Power Gas Turbine Drives on the Basis of Mathematical Models

*B. M. Osipov, A. V. Titov, and A. R. Khammatov*

69

---

## Aircraft and Rocket Engine Theory

Calculation of Energy Parameters in High-Speed Centrifugal Pumps of Low Specific Speed

*E. M. Kraeva*

73

Flight Efficiency of a Pulsejet

*V. N. Pobezhimov*

77

Mathematical Modeling and Experimental Investigations of Oxygen-Methane Fuel Combustion at Coaxial-Jet Supply into the Combustion Chamber of Liquid-Propellant Rocket Engine

*V. R. Rubinskii, S. P. Khrisanfov, V. Yu. Klimov, and A. V. Kretinin*

81

A Method for Calculating the Laser Rocket Engine Thermal State Based on the Optical Discharge with Numerous Plasma Formations

*A. G. Sattarov*

87

Intensification of Heat Exchange on the Convex Surface of an Annular Channel with Continuous Flow Swirling

*A. V. Shchukin, A. V. Il'inkov, and N. F. Maksimov*

95

---

## TECHNICAL NOTES

### Structural Mechanics and Strength of Flight Vehicles

Analysis of Shells of Revolution under Reversely Symmetrical Loading Using the Quadrature Method

*I. S. Akhmed'yanov*

102

---

### Flight Dynamics and Control of Flight Vehicles

Application of the Abel Equation to Describe the Precession Motion of a Gyrostabilized Platform

*V. A. Pogorelov, T. V. Klodina, and A. I. Sapozhnikov*

108

---

### Aircraft and Rocket Engine Design and Development

Application of Oil Dispersion to Enhance the Efficiency of Aircraft GTE Oil System Operation

*V. N. Pon'kin, B. A. Kessel', L. V. Goryunov, and V. V. Takmovtsev*

113

---

### Conversion of Aeronautical Equipment and Production

Thermodynamic Properties of Mixed Fuel Combustion Products

*A. B. Shigapov, I. Yu. Silov, and A.A. Shigapov*

117

---