

# Contents

TRANSLATOR'S AND EDITOR'S PREFACE.....	v
AUTHOR'S PREFACE TO RUSSIAN EDITION.....	vii
AUTHOR'S PREFACE TO ENGLISH EDITION.....	xi

## INTRODUCTION

1. Historical remarks and characteristic features of hypersonic aerodynamics.....	1
2. Basic aerodynamic problems connected with flight at hypersonic speeds.....	6
3. Some information on the properties of air at high temperatures.....	9
4. Experimental methods for studying high speed gas flows.....	16

### CHAPTER I

## GENERAL CONSIDERATIONS ON HYPERSONIC FLOWS OF AN IDEAL GAS

1. Formulation of the problem of supersonic flow of an ideal gas past a body.....	25
2. Additional remarks on the formulation of the problem of supersonic flows past bodies.....	30
3. Characteristic properties of hypersonic flows.....	36
4. Similarity law for limiting hypersonic flows past bodies of given shape.....	48

### CHAPTER II

## HYPERSONIC FLOWS PAST SLENDER BODIES WITH SHARP LEADING EDGES

1. Estimate of the disturbance produced by the supersonic motion of bodies in a gas.....	55
2. Similarity law for hypersonic flows past slender bodies.....	60
3. Simplification of the equations for hypersonic flows past slender bodies.....	69
4. The equivalence principle for hypersonic flows past slender bodies.....	72
5. Examples of the application of the equivalence principle.....	79

## CHAPTER III

**NEWTON'S LAW OF RESISTANCE; TANGENT-CONE AND  
TANGENT-WEDGE METHODS; THE BUSEMANN FORMULA  
AND THE BOUNDARY LAYER METHOD**

1. Newton's law of resistance.....	95
2. Use of the Newtonian formula for determining aerodynamic characteristics of bodies and for finding bodies of minimum drag	105
3. Tangent-cone and tangent-wedge methods.....	113
4. The Busemann formula.....	120
5. The determination of body shapes of minimum drag using the Busemann formula.....	128
6. Boundary layer method.....	136
7. Use of the equivalence principle in the boundary layer method.	146
8. Boundary layer method: examples.....	151

## CHAPTER IV

**METHODS USING SHOCK AND SIMPLE WAVE RELATIONS**

1. General remarks on the methods of calculating supersonic flows past airfoils.....	161
2. Exact method using shock and simple wave relations.....	166
3. Interaction of disturbances with a shock wave.....	171
4. Flows past wedgelike bodies and slender airfoils at large angles of attack.....	181
5. Approximate method using shock and simple wave relations (shock-expansion method).....	192
6. Generalization to flows past bodies of revolution.....	195

## CHAPTER V

**EFFECT OF SLIGHT LEADING EDGE BLUNTING ON  
HYPERSONIC FLOWS PAST BODIES**

1. Introductory remarks and formulation of the problem.....	201
2. Flows past a flat plate with a flat leading edge, and a right circular cylinder with its end normal to the free stream.....	207
3. Flow past a slender wedge with a blunt leading edge.....	218
4. Flow past a slender blunted cone.....	226
5. Similarity law for flows past slightly blunted slender bodies....	231
CITED REFERENCES.....	235
AUTHOR INDEX.....	253
SUBJECT INDEX.....	256