

CONTENTS

Chapter	Page
Aeroplane Design and Development	
1. Configuration development. Initial specification	7
2. Impact of civil airworthiness requirements and operational rules	11
3. Take-off mass	12
External Flight Loads	
1. D'Alambert's principle	25
2. Experimental determination of the load factor	27
3. The aeroplane in a vertical plane manouever	29
4. The aeroplane in a gust	30
5. Flight condition influence	32
6. ATM and HJTC requirements to the strength under flights loads	33
7. Definitions of ATM	33
8. Design airspeed	34
9. Requirements to strength and deformation	36
10. Design gust loads	37
11. Flight manoeuvring loads	38
Damage Tolerance and Fatigue Evaluation of Structures	
1. Main components of fatigue failure problem of aeroplane structure and main stages of its solution	44
2. Typical loading spectrum expected in service	45
3. Two models of turbulence	46
4. Fatigue characteristics	53
5. Linear rule of summing of fatigue damage (Miner's rule)	56
6. Full cycles method	59
7. Safe life calculation	61
8. Damage tolerance	64
9. Design of damage-tolerant structure	67
Wing	
1. Requirements	70
2. Wing loads	71
3. Internal force factors in a cross sections of a wing	73
4. Structure and structural model of a wing	77
5. Types of wing structure	79

6. Strength analysis of a wing	80
7. Strength and structure of wing details	88
8. Specific features of strength analysis of root cross-section	99

Flight Control Devices

1. Ailerons and spoilers	101
2. Aileron strength analysis	104
3. Empennage	106
4. Empennage loads	108
5. Specific features of structure and strength analysis of the empennage	109
6. Reduction of control forces	110

High-Lift Devices

1. Trailing-edge flaps	114
2. Leading-edge high-lift devices	115
3. Horizontal acceleration and deceleration control means	116
4. Structure and strength analysis of a flap	117