CONTENTS

1. INTRODUCTION 7

2. **VIBRATIONS** 10

2.1. Vibrations classification 12

2.2. Vibration sources 14

2.3. Impact of vibrations on man 17

2.4. Methods of assessing the impact of vibrations on humans 22

3. EFFECT OF VIBRATIONS ON DRIVER AND PASSENGERS OF CAR VEHICLES 29

3.1. Impact of local vibrations on the driver and passengers through the steering wheel and handles in passenger cars 30

3.2. Effect of road surface on general vibrations in passenger cars and delivery vans 51

3.3. Impact of road conditions on general vibrations in passenger cars 57

3.4. Comfort of driving selected passenger cars and lorries 71

3.5. General vibrations felt in the oldest passenger cars 75

3.6. Effect of tires on general vibrations in a passenger car 82

3.7. Vibration-isolation function of seats in a passenger car 87

3.8. Impact of suspension type on the perceived comfort of driving a car 99

3.9. The effect of the type of drice on general vibrations in public trasport buse 105

3.10. General vibrations felt when going over speed bumps 108

4. **NOISE** 122

4.1. Impact of noise on humans 126

4.2. Noise sources 128

4.3. Measurement of noise 129

5. NOISE IMPACT ON DRIVER AND PASSENGERS OF CAR VEHICLES 134

5.1. Noise acting on the driver and passengers in selected passenger cars 135

5.2. Impact of noise on the comfort of driving passenger cars 147

5.3. Impact of operating conditions on noise in passenger cars 152
5.4. Noise inside and outside passenger cars 157
5.5. Noise in old passenger cars and trucks 167
5.6. Noise on old public buses 189
6. **COMMUNICATION NOISE** 192
6.1. Measurement of communication noise 192
6.2. Noise assessment along selected communication routes of the Upper Silesian agglomeration 193
6.3. Assessment of traffic noise on the example of housing estate 200
6.4. The use of acoustic maps in the analysis of the effectiveness of acoustic screens 208
7. VIBROACOUSTIC DIAGNOSTICS 218
7.1. Measurement and processing of vibroacoustic signals 220
7.2. Diagnostic systems using vibroacoustic signals and artificial intelligence methods 237
8. VIBROACOUSTIC DIAGNOSTICS OF SELECTED ELEMENTS OF CAR VEHICLES 241
8.1. Diagnosing damage to the belt tensioner 242
8.2. Diagnosing bearing arrangements of car wheels 248
8.3. Diagnosing the technical condition of the car's internal combustion engine water pump 250
8.4. Diagnosing failures of components of a car's internal combustion engine not detected by the OBD system 255
BIBLIOGRAPHY 263
Abstract 291