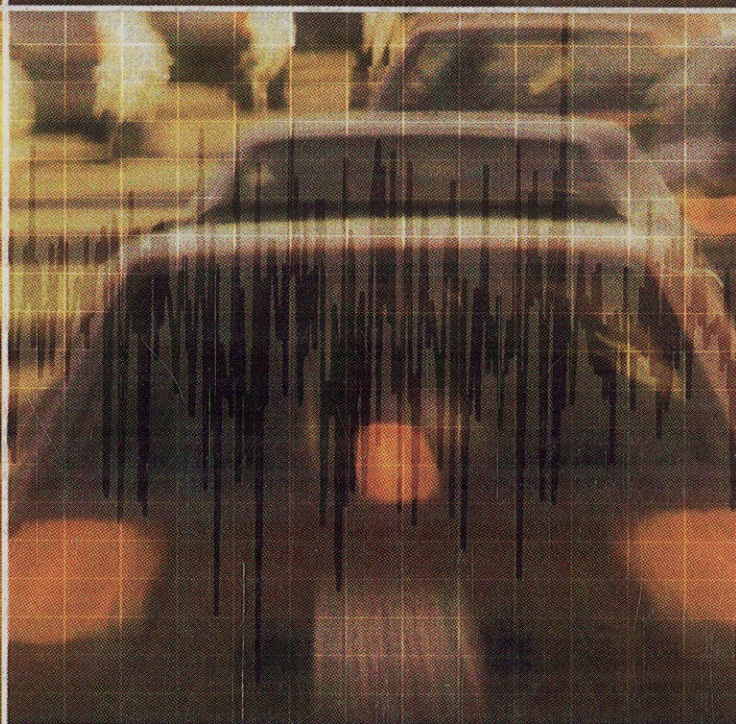


M. Khare & P. Sharma



Modelling Urban Vehicle Emissions



WITPRESS

Contents

Preface	xv
Chapter 1 Introduction	1
Chapter 2 Urban air quality management	5
2.1 General	5
2.2 Urban air quality management	7
2.2.1 Introduction	7
2.2.2 Real-time forecasting and health hazard warning system	8
Chapter 3 Air quality modelling	11
3.1 General	11
3.1.1 Objectives and scope of modelling	13
3.1.2 Air pollution models - classification criteria	13
3.2 Modelling approach	14
3.2.1 General	14
3.2.1.1 The diffusion equation	16
3.2.2 <i>Deterministic mathematical models</i>	18
3.2.2.1 Analytical (closed-form) models	18
3.2.2.2 Numerical models	22
3.2.3 Deterministic mathematical modelling - closing remarks	24
3.2.4 Statistical modelling	25
3.2.4.1 Linear regression models	26
3.2.4.2 Linear stochastic models	27
3.2.4.3 Statistical distribution models	30
3.2.5 Significance of statistical models	30
3.2.6 Statistical modelling - closing remarks	31
3.2.7 Physical models	32

Chapter 4 Air pollution due to vehicular exhaust emissions - a review	35
4.1 Introduction	35
4.2 Studies on air pollution from road traffic	35
4.2.1 General	35
4.2.2 Modelling studies	36
4.2.3 Model performance evaluation and comparative assessment	43
4.2.4 Air quality near urban intersections	45
4.2.5 Air quality in urban street canyons	46
4.2.6 Other relevant studies	48
4.3 Conclusions	50
 Chapter 5 Development of vehicular exhaust models	 51
5.1 Deterministic mathematical model	51
5.1.1 General	51
5.1.2 Model formulation	51
5.1.2.1 Model inputs	55
5.2 Linear stochastic models	58
5.2.1 General	58
5.2.1.1 The univariate Box-Jenkins time series methodology	58
5.2.1.2-Multivariate time series methodology - the transfer function model	63
5.3 Intervention analysis model	66
5.3.1 General	66
5.4 Extreme case prediction model	68
5.4.1 General	68
5.4.2 Extreme value theory	69
 Chapter 6 Application of vehicular exhaust models	 75
6.1 Vehicular exhaust models - application	75
6.1.1 Deterministic mathematical model	75
6.1.2 Traffic volume model	81
6.1.3 Linear stochastic models	85
6.1.3.1 Univariate models	85
6.1.3.2 Bivariate models	95
6.1.3.3 Multivariate models	116
6.1.4 Intervention analysis model	132
6.1.5 Extreme case prediction model	135
6.2 Deterministic mathematical model vs linear stochastic model	142
 Epilogue	 145

Appendix I	Time series analysis	149
Appendix II	Special functions	165
Appendix III	Emission factors	169
Appendix IV	Statistical properties of type I asymptotic distribution	173
Appendix V	Description of the monitoring site and instrumentation	175
Appendix VI	Statistical model performance evaluation indices	179
References		181
Index		209