

Index

- Accelerometer 250
 - Exercises 4.2 4.3 55, 57
- Correlation function 234, 278, 308, 317, 338
- Correlation matrix
 - see Model based signal processing
- Cross spectrum
 - See Identification
- Data acquisition 299
 - Analog to digital converter 300
 - Anti aliasing filter 303
 - Exercise 10.4 149
 - Normalized frequency 302
 - Nyquist frequency 302
 - Nyquist theorem 302
 - Quantization error 300
 - Exercise 10.1 10.2 145, 146
 - Sampling theorem 301
 - Exercises 10.3 148
- Delays in systems 337
 - Cepstral analysis 338
 - Cepstrum power, complex 340
 - Exercise 14.3 315
 - Correlation method 338
 - Bandwidth effect 338
 - Exercise 14.2 213
 - Transfer function, Exercise 14.1 212
- Diagnostics (vibration based) 327
 - Bearing diagnostics 328
 - Exercise 13.1 13.2 189, 191
 - Bearing inner race default 330
 - Bearing outer race default 329
 - Bearings-envelope method 330
 - Gears 334
 - Meshing frequency 334
 - Exercises 13.3 192
 - Imbalance 328
 - Rotating machines 327
 - Structural effects 327
 - Exercise 13.4 13.5 194, 196
- Envelopes 291, 330
 - Exercise 8.1 129
- Estimation errors, bias and random 235
- Fast Fourier Transform–FFT
 - see Fourier methods
 - see Spectral analysis
- Filters 253
 - Analog 254
 - Digital 255
 - Exercises 5.1 5.2 65, 66
 - Filter window method 261
 - FIR filter 260
 - Group delay 264
 - IIR filter 260
 - Linear phase filter 263
 - Exercise 5.3 68
 - Running average filter 260
 - Exercise 5.4 70
 - Specification 257
- Fourier methods 237
 - Discrete Fourier transform–DFT 242
 - Index interpretation 244
 - Negative indexes 242
 - Symmetries 242
 - Fast Fourier Transform FFT 244
 - FFT and spanned number
 - of periods 246
 - Index interpretation 244
 - Exercises 3.8 3.9 33, 35
 - Fourier series 237
 - Exponential form 238
 - Modulated signals 240
 - Exercise 3.4 28

- Fourier methods (*Continued*)
 - Spanned number of periods 238
 - Trigonometric form 237
 - Execises 3.1 3.2 3.3 23–26
- Fourier transform 240
 - Theorems 241
 - Uncertainty theorem 241
- Exercise3.6 30
- Parseval theorem 244
- Windows 246
 - Exercises 3.11 3.12 38–39
- Frequency domain, rationale 228
 - Exercises 1.1 1.2 3–5
- Hilbert Transform 291
 - Analytic signal 292
 - Instantaneous frequency 292
 - Narrow band signal 292
- Identification 305
 - Bias errors 312
 - Exercise 11.1 161
 - Bias errors with noise 312
 - Coherence bias error 313
 - Coherence function 310
 - Coherence function, random errors 314
 - Cross spectrum 308
 - Error due to delay 313
 - Exercise 11.2 163
 - Excitations 306
 - H1 estimator 308
 - H2 estimator 310
 - Exercise 11.4 165
 - Identification additional input 313
 - Identification with noise 307
 - Leakage error 314
 - Noise at input 310
 - Random error 313
 - The noiseless case 306
- Leakage 275, 289
 - See Spectral analysis
- Model based signal processing 315
 - Akaike Information Criterion - AIC 323
 - AR signal 316
 - ARMA signal 316
 - Correlation matrix 324
 - Deterministic signal model 320
 - Diagnostics 328
 - Exercise 12.2 179
 - Final Prediction Error- FPE 323
 - Least square estimate 319
 - MA signals 315
 - Modeling 317
 - Models 315
 - Order determination 322
 - Exercises 12.1 12.3 177–179
 - Prony 316
 - Sequential methods 319
 - Spectral analysis 321
 - Exercise 12.1 177
- Modulation- AM FM 240
 - Sidebands 240
 - Exercise 3.4 28
 - Exercise 7.8 109
 - Exercises 13.2 – 13.4 191–194
- Nyquist frequency 244, 302
- Signals 231
 - Distribution, Gaussian, Normal 234
 - Energy signals, units 231
 - Exercise 2.2 13
 - Modulation 240
 - Power signal, units 232
 - Exercise 2.2 13
 - Probability density 233
 - Random 232
 - Exercise 2.3 14
 - RMS 234
 - Statistical moments 233
- Spectral analysis 271
 - Bias errors 281
 - Errors 278
 - Leakage 279
 - with Hanning window 281
 - with rectangular window 280
 - Exercises 7.2 7.3 7.4 100–103
 - Overlap analysis 287
 - Periodic signals, FS 272
 - Power Spectral Density (PSD) and units 278
 - Exercise 7.1b 98
 - Random error control 288
 - Exercise 7.7 7.8 108–109
 - Random errors 284
 - Random signals 278
 - Spectral analysis, spanned periods 275
 - Exercise 7.8 109
 - Windows 280
 - Transients, FT 275
 - Winer-Khintchine theorem 278
 - Exercise 7.9 111
 - Zero padding 289
 - Exercise 7.5 104
- Synchronous averaging
 - see Time Domain Averaging
- Systems 247
 - Analog system impulse response 248
 - Analog systems 247
 - Analog systems FRF 247
 - Discrete system FRF 249

- Discrete system impulse response 249
 - Exercise 4.1 53
 - Discrete systems 248
 - SDOF system 251
- Time domain averaging 265
 - Bandwidth 266
 - Principle 265
 - Exercise 6.1 83
 - Rejection of noise 268
 - Exercise 6.2 84
 - With decaying memory 269
 - Exercise 6.3 86
- Time frequency analysis 295
 - Short Time Fourier Transform - STFT 296
 - Spectrogram 295
 - Exercises 9.1 9.2 135–136
 - Wavelets 295
 - Wigner Ville 295
- Windows 246, 261, 280, 289, 296, 312

