

1. Record Nr.	UNINA9910555012803321
Autore	Ruiz Alejandro Garces <1981->
Titolo	Mathematical programming for power systems operation : from theory to applications in Python / / Alejandro Garces Ruiz
Pubbl/distr/stampa	Hoboken, New Jersey : , : John Wiley & Sons Inc., , [2022] ©2022
ISBN	1-119-74728-7 1-119-74729-5 1-119-74727-9
Descrizione fisica	1 online resource (298 pages)
Collana	IEEE Press Ser.
Disciplina	621.31
Soggetti	Electric power systems - Mathematical models Convex programming Python (Computer program language) Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Mathematical Programming for Power Systems Operation -- Contents -- Acknowledgment -- Introduction -- 1 Power systems operation -- 1.1 Mathematical programming for power systems operation -- 1.2 Continuous models -- 1.2.1 Economic and environmental dispatch -- 1.2.2 Hydrothermal dispatch -- 1.2.3 Effect of the grid constraints -- 1.2.4 Optimal power flow -- 1.2.5 Hosting capacity -- 1.2.6 Demand-side management -- 1.2.7 Energy storage management -- 1.2.8 State estimation and grid identification -- 1.3 Binary problems in power systems operation -- 1.3.1 Unit commitment -- 1.3.2 Optimal placement of distributed generation and capacitors -- 1.3.3 Primary feeder reconfiguration and topology identification -- 1.3.4 Phase balancing -- 1.4 Real-time implementation -- 1.5 Using Python -- Part I Mathematical programming -- 2 A brief introduction to mathematical optimization -- 2.1 About sets and functions -- 2.2 Norms -- 2.3 Global and local optimum -- 2.4 Maximum and minimum values of continuous functions -- 2.5 The gradient method -- 2.6 Lagrange multipliers -- 2.7 The Newton's method -- 2.8 Further

readings -- 2.9 Exercises -- 3 Convex optimization -- 3.1 Convex sets -- 3.2 Convex functions -- 3.3 Convex optimization problems -- 3.4 Global optimum and uniqueness of the solution -- 3.5 Duality -- 3.6 Further readings -- 3.7 Exercises -- 4 Convex Programming in Python -- 4.1 Python for convex optimization -- 4.2 Linear programming -- 4.3 Quadratic forms -- 4.4 Semidefinite matrices -- 4.5 Solving quadratic programming problems -- 4.6 Complex variables -- 4.7 What is inside the box? -- 4.8 Mixed-integer programming problems -- 4.9 Transforming MINLP into MILP -- 4.10 Further readings -- 4.11 Exercises -- 5 Conic optimization -- 5.1 Convex cones -- 5.2 Second-order cone optimization -- 5.2.1 Duality in SOC problems -- 5.3 Semidefinite programming. 5.3.1 Trace, determinant, and the Shur complement -- 5.3.2 Cone of semidefinite matrices -- 5.3.3 Duality in SDP -- 5.4 Semidefinite approximations -- 5.5 Polynomial optimization -- 5.6 Further readings -- 5.7 Exercises -- 6 Robust optimization -- 6.1 Stochastic vs robust optimization -- 6.1.1 Stochastic approach -- 6.1.2 Robust approach -- 6.2 Polyhedral uncertainty -- 6.3 Linear problems with norm uncertainty -- 6.4 Defining the uncertainty set -- 6.5 Further readings -- 6.6 Exercises -- Part II Power systems operation -- 7 Economic dispatch of thermal units -- 7.1 Economic dispatch -- 7.2 Environmental dispatch -- 7.3 Effect of the grid -- 7.4 Loss equation -- 7.5 Further readings -- 7.6 Exercises -- 8 Unit commitment -- 8.1 Problem definition -- 8.2 Basic unit commitment model -- 8.3 Additional constraints -- 8.4 Effect of the grid -- 8.5 Further readings -- 8.6 Exercises -- 9 Hydrothermal scheduling -- 9.1 Short-term hydrothermal coordination -- 9.2 Basic hydrothermal coordination -- 9.3 Non-linear models -- 9.4 Hydraulic chains -- 9.5 Pumped hydroelectric storage -- 9.6 Further readings -- 9.7 Exercises -- 10 Optimal power flow -- 10.1 OPF in power distribution grids -- 10.1.1 A brief review of power flow analysis -- 10.2 Complex linearization -- 10.2.1 Sequential linearization -- 10.2.2 Exponential models of the load -- 10.3 Second-order cone approximation -- 10.4 Semidefinite approximation -- 10.5 Further readings -- 10.6 Exercises -- 11 Active distribution networks -- 11.1 Modern distribution networks -- 11.2 Primary feeder reconfiguration -- 11.3 Optimal placement of capacitors -- 11.4 Optimal placement of distributed generation -- 11.5 Hosting capacity of solar energy -- 11.6 Harmonics and reactive power compensation -- 11.7 Further readings -- 11.8 Exercises -- 12 State estimation and grid identification -- 12.1 Measurement units. 12.2 State estimation -- 12.3 Topology identification -- 12.4 Ybus estimation -- 12.5 Load model estimation -- 12.6 Further readings -- 12.7 Exercises -- 13 Demand-side management -- 13.1 Shifting loads -- 13.2 Phase balancing -- 13.3 Energy storage management -- 13.4 Further readings -- 13.5 Exercises -- A The nodal admittance matrix -- B Complex linearization -- C Some Python examples -- C.1 Basic Python -- C.2 NumPy -- C.3 Matplotlib -- C.4 Pandas -- Bibliography -- Index -- EULA.
