Preface

World wind generation capacity has more than quadrupled between 2000 and 2006, doubling every 3 years. At the end of 2012, worldwide wind capacity was 282 GW, growing by 44 GW over the preceding year. Due to this reason, it is considered as the fastest growing energy resource in the world currently. Several factors have led to this transformation in the last decade. In particular, advances in technologies have certainly played a major role in the wind energy conversion. In addition, in countries like United States, wind energy production receives several subsidies to increase its attractiveness, and also to compensate for subsidies received by other forms of production.

The *Handbook on Wind Power Systems* is divided into four parts: optimization problems in wind power generation, grid integration of wind power systems, modeling, control and maintenance of wind facilities, and innovative wind energy generation.

Several optimization problems arising in wind power systems are addressed in the book. Reliability assessment unit commitment with uncertain wind power is addressed by Wang et al. while a wind farm layout optimization problem is discussed by Samorani et al. Additionally, several risk management tools for wind power trades are given by Yamada et al. Another chapter on innovative wind energy models and prediction methodologies by Sen et al. is also included.

Grid integration of wind power systems is an important problem and has been addressed by several authors in the book. Vespucci et. al. talk about stochastic models for integration of wind power production in a conventional power production system, while Santoso et al. discuss modeling of wind power plants. Deterministic and probabilistic approaches for steady-state analysis of distribution systems with wind farms is discussed by Carpinelli et al. Additionally, advanced control functionalities for grid integration of large-scale wind generation is addressed by Resende et al. Network stability issues arising under high wind power penetration is discussed by Tsikalakis et al. while power system operations with large penetrations of wind power is discussed by Denny et al. Rosa et al. assess the operational reserves under wind power fluctuations in power systems.

Several chapters in the handbook are dedicated to modeling, control, and maintenance of wind facilities. Namak et al. give a comprehensive review of floating wind turbine controllers, while RamiÌrez et al. discuss in detail the modeling aspects of wind turbines and wind parks. Another chapter on grid support capabilities of wind

turbines is discussed by Michalke et al. Coordination between wind farms and storage devices is discussed by Castronuovo et al. while a hybrid offshore wind and tidal turbine generation system is discussed by Rahman et al. Wind energy facility maintenance and monitoring are discussed by Ding et al. and Milan et al.

Satellite remote sensing in offshore wind energy is discussed by Hasager et al, while Optimization of AC electric power systems of offshore wind farms in addressed by Ramos et al. Low power wind energy conversion systems are discussed by Bratcu et al. and small wind-driven devices are discussed by Ahmed et al.

The chapters of the handbook are contributed by experts working on different aspects of wind energy generation and conversion. We would like to thank all the authors for their contribution, all reviewers for their constructive comments, and the Springer team for making this project possible.

Panos M. Pardalos
Steffen Rebennack
Mario V. F. Pereira
Niko A. Iliadis
Vijay Pappu

http://www.springer.com/978-3-642-41079-6

Handbook of Wind Power Systems

Pardalos, P.M.; Rebennack, S.; Pereira, M.V.F.; Iliadis, N.A.; Pappu, V. (Eds.)

2013, IX, 843 p. 445 illus., Hardcover
ISBN: 978-3-642-41079-6