



1st ed. 2016, XVII, 117 p. 32 illus., 14 illus. in color.

### Printed book

Hardcover

109,99 € | £99.99 | \$139.99

<sup>[1]</sup>117,69 € (D) | 120,99 € (A) | CHF 130,00

Softcover

93,44 € | £74.99 | \$109.99

<sup>[1]</sup>99,98 € (D) | 102,78 € (A) | CHF 110,50

### eBook

78,10 € | £59.99 | \$84.99

<sup>[2]</sup>78,10 € (D) | 78,10 € (A) | CHF 88,00

Available from your library or [springer.com/shop](http://springer.com/shop)

### MyCopy <sup>[3]</sup>

Printed eBook for just

€ | \$ 24.99

[springer.com/mycopy](http://springer.com/mycopy)

Nicolás Rubido

# Energy Transmission and Synchronization in Complex Networks

Mathematical Principles

Series: Springer Theses

- Nominated as an outstanding Ph.D. thesis by the University of Aberdeen, UK
- Offers exact solutions to the problems addressed
- Outlines explicit derivations
- Presents easy implementation and readability of results

This work tackles the problems of understanding how energy is transmitted and distributed in power-grids as well as in determining how robust this transmission and distribution is when modifications to the grid or power occur. The most important outcome is the derivation of explicit relationships between the structure of the grid, the optimal transmission and distribution of energy, and the grid's collective behavior (namely, the synchronous generation of power). These relationships are extremely relevant for the design of resilient power-grid models. To allow the reader to apply these results to other complex systems, the thesis includes a review of relevant aspects of network theory, spectral theory, and novel analytical calculations to predict the existence and stability of periodic collective behavior in complex networks of phase oscillators, which constitute a paradigmatic model for many complex systems.

Order online at [springer.com](http://springer.com) / or for the Americas call (toll free) 1-800-SPRINGER / or email us at: [customerservice@springernature.com](mailto:customerservice@springernature.com). / For outside the Americas call +49 (0) 6221-345-4301 / or email us at: [customerservice@springernature.com](mailto:customerservice@springernature.com).

The first € price and the £ and \$ price are net prices, subject to local VAT. Prices indicated with [1] include VAT for books; the €(D) includes 7% for Germany, the €(A) includes 10% for Austria. Prices indicated with [2] include VAT for electronic products; 19% for Germany, 20% for Austria. All prices exclusive of carriage charges. Prices and other details are subject to change without notice. All errors and omissions excepted. [3] No discount for MyCopy.

