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	Disciplina	536.7
	Soggetti	Fluid mechanics
		Power electronics
		Thermodynamics
		Heat engineering
		Heat transfer
		Mass transfer
		Computer mathematics
		Chemical engineering
		Materials science
		Force and energy
		Engineering Fluid Dynamics
		Power Electronics, Electrical Machines and Networks
		Engineering Thermodynamics, Heat and Mass Transfer
		Computational Science and Engineering
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		Energy Materials
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	Nota di bibliografia	Includes bibliographical references at the end of each chapters.
	Nota di contenuto	Introduction -- Scale Model -- CFD Sclae Model -- The FluSHELL Tool -- FluSHELL Validation -- Conclusions and Future Work.
	Sommario/riassunto	This thesis addresses a novel application of network modelling methodologies to power transformers. It develops a novel thermal

model and compares its performance against that of a commercial computational fluid dynamics (CFD) code, as well as in experiments conducted in a dedicated setup built exclusively for this purpose. Hence, the thesis cross-links three of the most important aspects in high-quality research: model development, simulation and experimental validation. Network modelling is used to develop a tool to simulate the thermal performance of power transformers, widely acknowledged to be critical assets in electrical networks. After the strong de-regulation of electricity markets and de-carbonization of worldwide economies, electrical networks have been changing fast. Both asset owners and equipment manufacturers are being driven to develop increasingly accurate modelling capabilities in order to optimize either their operation or their design. Temperature is a critical parameter in every electric machine and power transformers are no exception. As such, the thesis is relevant for a wide range of stakeholders, from utilities to power transformer manufacturers, as well as researchers interested in the energy industry. It is written in straightforward language and employs a highly pedagogic approach, making it also suitable for non-experts.