<<现代电力系统分析>>

图书基本信息

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作者：D P KOTHARI,I J NAGRATH

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前言

由于电力系统规划、设计、运行和控制都要进行电力系统分析，因此，在国内外的高等院校中都把“电力系统分析”作为本科生的重要专业课程之一，有的在研究生阶段还进一步将它列为学位课程。
作为这门课程的教材，国内外已经有十多种，本书为印度理工学院Kothari和贝拉理工学院Nagrath两位教授编写的第3版。
书中的第2章到第12章内容属于电力系统分析的传统和基本内容，主要包括电力系统元件的参数、等值电路和稳态运行特性，电力系统的潮流计算，电力系统的运行优化以及自动发电和电压控制，对称和不对称故障分析，电力系统稳定性等。
第13章到第17章是第3版新增的内容，包括电力系统静态安全分析，电力系统状态估计，FACTS（柔性交流输电系统）元件及其对系统参数和功率的补偿，电力负荷预测，电力系统电压稳定性。
此外，在第1章中还增加了新能源和可再生能源发电、分散和分布式发电、电力市场以及电能生产对环境的影响等方面的基本知识。
在传统部分的编写中，内容比较全面、完整。
例如，在潮流计算中，包括了近似潮流、高斯·赛得尔法、牛顿－拉夫逊法以及快速解耦法；在运行方式优化方面，从经典的基于等微增率的经济调度，到最优潮流和机组经济组合；在对称和不对称故障分析中，除了简单系统的分析方法以外，介绍了复杂系统的计算机分析方法，等等。
新增加的内容使本书更贴近电力系统的运行和控制。
此外，本书还有以下的显著特点：　　1.书中包含了大量的例题，它们除了说明具体的计算方法和过程以外，还可以让读者顺便了解很多实际知识（例如元件及系统的结构和参数等）。
有的则通过例题介绍其他方面的内容和知识（例如，在例2.4中引入通信干扰和谐波等知识），从而扩大了本书所包含的信息量。
另外，书中还给出了大量的习题并附有相应的答案，以便读者进一步巩固和深化有关的理论和分析方法。
特别地，这些例题和习题有助于读者进行自学。

内容概要

《现代电力系统分析（第3版）》中包含了大量的例题，它们除了说明具体的计算方法和过程以外，还可以让读者顺便了解很多实际知识（例如元件及系统的结构和参数等）。
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作者简介

D P Kothari，is Professor， Centre for Energy Studies，Indian Institute of Technology， Delhi. He hasbeen Head of the Centre for Energy Studies（1995-97） and Principal （1997-98） VisvesvarayaRegional Engineering College， Nagpur. He has been Director-incharge， liT Delhi （2005）， Deputy Director （Admn.）（2003-2006）. Earlier （1982-83 and 1989）， he was a visiting fellow at RMIT，Melbourne， Australia. He obtained his BE， ME and Ph.D degrees from BITS， Pilani. A fellow of the Institution of Engineers （India）， fellow of National Academy of Engineering，fellow of National Academy of Sciences， Senior Member IEEE， Member IEE，Life Member ISTE， Professor Kothari has published/presented around 500papers in national and international journals/conferences. He has authored/co-authored more than 18 books， including Power System Optimization， ModernPower System Analysis， Electric Machines， Power System Transients， Theoryand Problems of Electric Machines and Basic Electrical Engineering. Hisresearch interests include power system control， optimization， reliability andenergy conservation. He has received the National Khosla award for LifetimeAchievements in Engineering for 2005 from liT Roorkee. I J Nagrath is Adjunct Professor， BITS， Pilani， and retired as Professor of electrical engineering and Deputy Director of Birla Institute of Technology and Science， Pilani. He obtained his BE with Hons. in electrical engineering from the University of Rajasthan in 1951 and MS from the University of Wisconsin in 1956. He has co-authored several successful books which include Electric Machines， Modern Power System Analysis and Systems：Modelling and Analysis. He has also published several research papers in prestigious national and international journals.

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章节摘录

Demerits 1. Nuclear reactors produce radioactive fuel waste, the disposal of which poses serious environmental hazards. 2. The rate of nuclear reaction can be lowered only by a small margin, so that the load on a nuclear power plant can only be permitted to be marginally reduced below its full load value. Nuclear power stations must, therefore, be realiably connected to a power network, as tripping of the lines connecting the station can be quite serious and may required shutting down of the reactor with all its consequences. 3. Because of relatively high capital cost as against running cost, the nuclear plant should operate continuously as the base load station. Wherever possible, it is preferable to support such a station with a pumped storage scheme mentioned earlier. 4. The greatest danger in a fission reactor is in the case of loss of coolant in an accident. Even with the control rods fully lowered quickly called scram operation, the fission does continue and its after-heat may cause vaporizing and dispersal of radioactive material. The world uranium resources are quite limited, and at the present rate may not last much beyond 50 years. However, there is a redeeming feature. During the fission of 235U, some of the neutrons are absorbed by the more abundant uranium isotope 23SU （enriched uranium contains only about 3% of 235U while most of its is ） converting it to plutonium, which in itself is a fissionable material and can be extracted from the reactor fuel waste by a fuel reprocessing plant. Plutonium would then be used in the next generation reactors （fast breeder reactors-FBRs）, thereby considerably extending the life of nuclear fuels. The FBR technology is being intensely developed as it will extend the availability of nuclear fuels at predicted rates of energy consumption to several centuries. Figure 1.9 shows the schematic diagram of an FBR. It is essential that for breeding operation, conversion ratio （fissile material generated/fissile material consumed） has to be more than unity. This is achieved by fast moving neutrons so that no moderator is needed. The neutrons do slow down a little through collisions with structural and fuel elements. The energy density/kg of fuel is very high and so the core is small. It is therefore necessary that the coolant should possess good thermal properties and hence liquid sodium is used. The fuel for an FBR consists of 20% plutonium plus 8% uranium oxide. The coolant, liquid sodium, leaves the reactor at 650°C at atmospheric pressure. The heat so transported is led to a secondary sodium circuit which transfers it to a heat exchanger to generate steam at 540°C.

编辑推荐

《现代电力系统分析(第3版)》介绍了现代电力系统的运行、控制和分析方法。
第3版的主要特色　　新增章节　　电力系统安全性　　状态估计　　电力系统中的补偿装置（包括SVS和FACTS）　　负荷预测　　电压稳定　　新增附录　　MATLAB和SIMULINK在电力系统中的应用演示　　基于计算机的电力系统实时控制　　专家评论　　《现代电力系统分析(第3版)》内容全面、组织合理、材料新颖，叙述清晰流畅，易于自学。
同时，书中每一个概念和方法都有相应的算例进行说明。

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