

# Power Quality: Problems and Mitigation Techniques

By Bhim Singh, Ambrish Chandra, Kamal Al-Haddad



**Power Quality: Problems and Mitigation Techniques** By Bhim Singh, Ambrish Chandra, Kamal Al-Haddad

Maintaining a stable level of power quality in the distribution network is a growing challenge due to increased use of power electronics converters in domestic, commercial and industrial sectors. Power quality deterioration is manifested in increased losses; poor utilization of distribution systems; mal-operation of sensitive equipment and disturbances to nearby consumers, protective devices, and communication systems. However, as the energy-saving benefits will result in increased AC power processed through power electronics converters, there is a compelling need for improved understanding of mitigation techniques for power quality problems.

This timely book comprehensively identifies, classifies, analyses and quantifies all associated power quality problems, including the direct integration of renewable energy sources in the distribution system, and systematically delivers mitigation techniques to overcome these problems.

Key features:

- Emphasis on in-depth learning of the latest topics in power quality extensively illustrated with waveforms and phasor diagrams.
- Essential theory supported by solved numerical examples, review questions, and unsolved numerical problems to reinforce understanding.
- Companion website contains solutions to unsolved numerical problems, providing hands-on experience.

Senior undergraduate and graduate electrical engineering students and instructors will find this an invaluable resource for education in the field of power quality. It will also support continuing professional development for practicing engineers in distribution and transmission system operators.

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*By Bhim Singh, Amrish Chandra, Kamal Al-Haddad*

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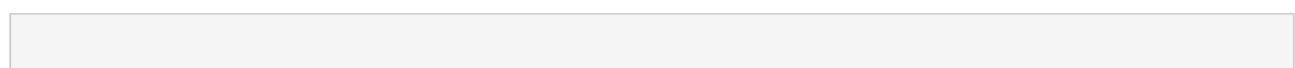
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**Power Quality: Problems and Mitigation Techniques** By Bhim Singh, Amrish Chandra, Kamal Al-Haddad **Bibliography**

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About the Author

**Professor Bhim Singh** has worked at the IIT Delhi Department of Electrical Engineering since 1997. He has 30 years' experience in research, consulting and teaching, has organized more than 40 short term courses and workshops, and has delivered more than 100 invited specialized lectures. He has chaired many international and national conferences, including the IEEE International Conferences on Power Electronics, Drives and Energy Systems in 2006. Professor Singh holds one US and one Indian Patent and has filed nine Indian patents. He is a Fellow of many engineering institutions including the Indian National Academy of Engineering and the Indian Academy of Sciences.

**Professor Ambrish Chandra** became a Professor in Electrical Engineering Department at ETS in 1999. His main research interest areas are: power quality, active filters, static reactive power compensation, FACTS and control & integration of renewable energy resources. Professor Chandra is a Fellow of many engineering institutions including IEEE, IET (UK), IE (India) as well as a Life Member of the Indian Society for Technical Education (ISTE).

**Professor Kamal Al-Haddad** has been a Professor within ETS' Electrical Engineering Department since 1990. His research interest areas include: high efficient static power converters, harmonics & reactive power

control using hybrid filters, switch mode & resonant converters, the development of prototypes for various industrial applications in electric traction, and power supply for drives & telecommunication. Professor Al-Haddad is an IEEE Fellow, a Canadian Academy of Engineering Fellow and life member of the Circle of Excellence of the University of Quebec. Presently he is IEEE Industrial Electronics society President Elect.

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