

closing time ...

Conclusions

- ▶ seminar about current injection methods in three-phase rectifiers
- ▶ however, primarily a research experience ...
- ▶ about evolution of ideas ...
- ▶ about inducing ideas ...
- ▶ about experience that unexpected happens ...
- ▶ that assumptions might be wrong ...
- ▶ that serendipities happen ...
- ▶ but only if you are doing something ...
- ▶ with interest and passion ...
- ▶ or just the opposite ...
- ▶ but doing.

closing time ...

back to work!

- ▶ about curiosity ...
- ▶ that does not provide a result immediately ...
- ▶ but maybe someday ... or maybe never ...
- ▶ since the science begins at the crossing ...
- ▶ where the right way is not known ...
- ▶ and you are curious to find it ...
- ▶ not always knowing why ...
- ▶ about accepted and rejected papers ...
- ▶ and application of ideas developed somewhere else ...
- ▶ by someone else ...
- ▶ and that straight roads are not that much fun ...
- ▶ but sinusoidal are!

1. introduction
2. current injection
3. current injection devices
4. current injection networks
5. the optimal current injection
6. switching current injection device
7. the discontinuous conduction mode
8. passive resistance emulation

1. Introduction

2. The Third Harmonic Current Injection

- ▶ three-phase diode bridge rectifiers
- ▶ methods to measure their parameters
- ▶ using off-line post-processing
- ▶ models developed
- ▶ and compared to experiments
- ▶ to gain confidence
- ▶ and to get acquainted
- ▶ **normalization introduced**
- ▶ spectra derived
- ▶ and the problem identified

- ▶ a way to patch the gaps in the input currents
- ▶ optimization of the injection parameters
- ▶ and a conclusion that improvements do not come for free
- ▶ about symbolic computation
- ▶ and about a misconception

3. Current Injection Devices

4. Current Injection Networks

- ▶ a story about cutting a current in three equal pieces
- ▶ by a magnetic device
- ▶ about VA-rating
- ▶ about some magnetic circuits
- ▶ and about stray flux
- ▶ that causes sometimes parasitic inductance

- ▶ how to create a simple circuit that provides the current to be injected ...
- ▶ about parasitic effects
- ▶ and spectral analysis
- ▶ about evolution of ideas
- ▶ and about wrong assumptions
- ▶ that are going to follow us for the most of the time

5. The Optimal Current Injection

- ▶ ideal input currents might be achieved
- ▶ for almost the same price
- ▶ if you allow resistors
- ▶ or if you can emulate them
- ▶ this required just some linear algebra
- ▶ at a right moment
- ▶ which everyone knew ... after they saw

6. Switching Current Injection Device

- ▶ a logical solution to our problem
- ▶ and an efficient one
- ▶ but requires three bidirectional switches
- ▶ and some control circuitry
- ▶ reduces currents that flow around
- ▶ otherwise almost the same ...

7. The Discontinuous Conduction Mode

- ▶ honestly, a dirt hidden beneath the carpet for a long time
- ▶ but fun to analyze
- ▶ and turned out to be useful
- ▶ later on
- ▶ a nice application of Dirac δ impulses
- ▶ and a good prediction
- ▶ normalization
- ▶ and numerical simulation
- ▶ to get better predictions, but fairly general

8. Passive Resistance Emulation

- ▶ a method to improve efficiency
- ▶ a simple method
- ▶ actually, two methods: current and voltage loaded
- ▶ application of methods developed for resonant converters
- ▶ current loaded resistance emulator expected to be the better one
- ▶ but it turned out to be the worse
- ▶ and more complex
- ▶ the voltage loaded resistance emulator turned out to be better
- ▶ and there was a serendipity, the output filter should be omitted

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THE END