

# ENERGETSKA ELEKTRONIKA

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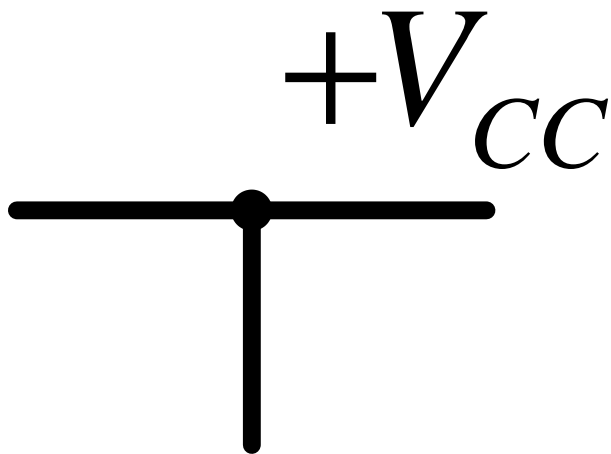
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# Šta je energetska elektronika?

Uvod u energetska elektroniku: komponente, sistemi, zahtevi. DC-DC konvertori, osnovne strukture: buck, boost, buck-boost. Metodi analize u ustaljenom stanju; volt-sekund i amper-sekund balans. Kontinualni i diskontinualni režim rada. Projektovanje magnetskih komponenata. Izolovani DC-DC konvertori: flyback, forward, push-pull, half-bridge, full-bridge. Upravljanje DC-DC konvertorima: impulsna širinska modulacija i programiranje struje. Metodi merenja struje. Usrednjeni modeli konvertora za kontinualni režim rada. Ispravljači: klasifikacija i parametri. Faktor snage i ukupno harmonijsko iyobličenje. Fazno kontrolisani konvertori. Uobličavanje ulazne struje ispravljača primenom prekidačkih konvertora. Invertori, namena, struktura, klasifikacija i upravljanje. Primena invertora, sistemi besprekidnog napajanja, upravljanje motorima.

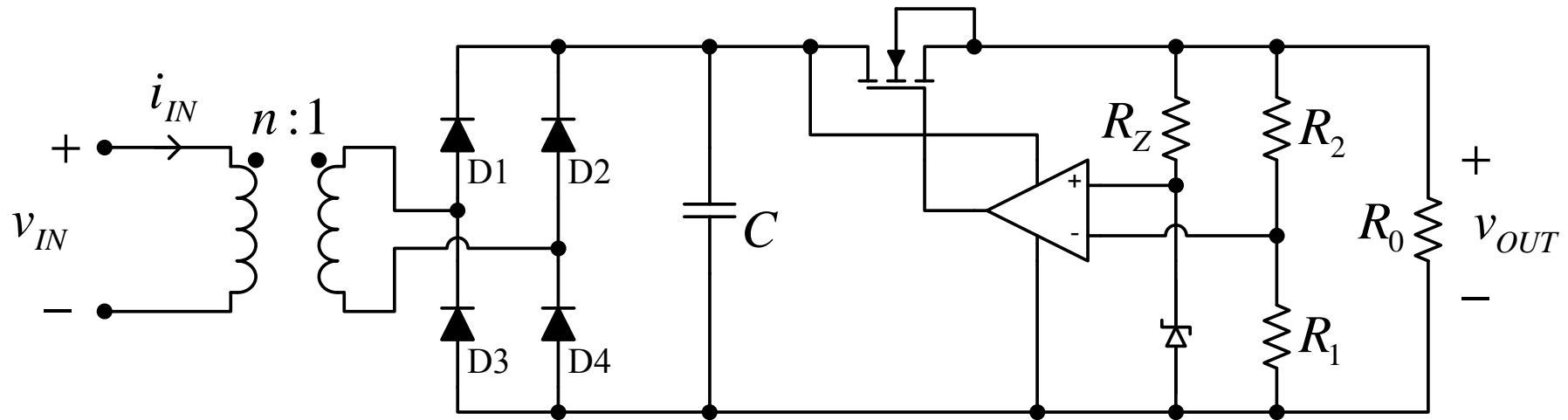
# Šta je energetska elektronika?

Odakle dolazi  $+V_{CC}$ ?



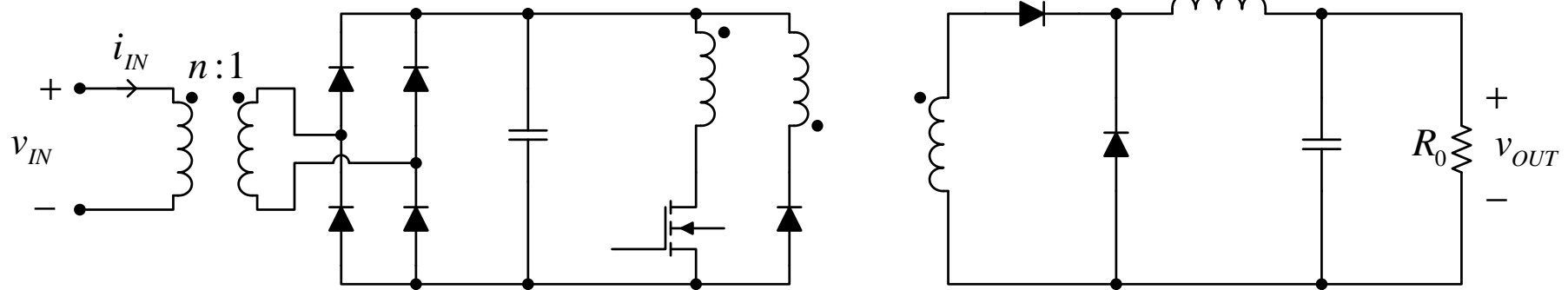
Odakle dolazi +Vcc?

Analogna elektronika:



# Odakle dolazi +Vcc?

## Energetska elektronika:



- veći koeficijent korisnog dejstva
- manje dimezije
- bolje upravljanje
- nove mogućnosti

# Čime se bavi energetska elektronika?

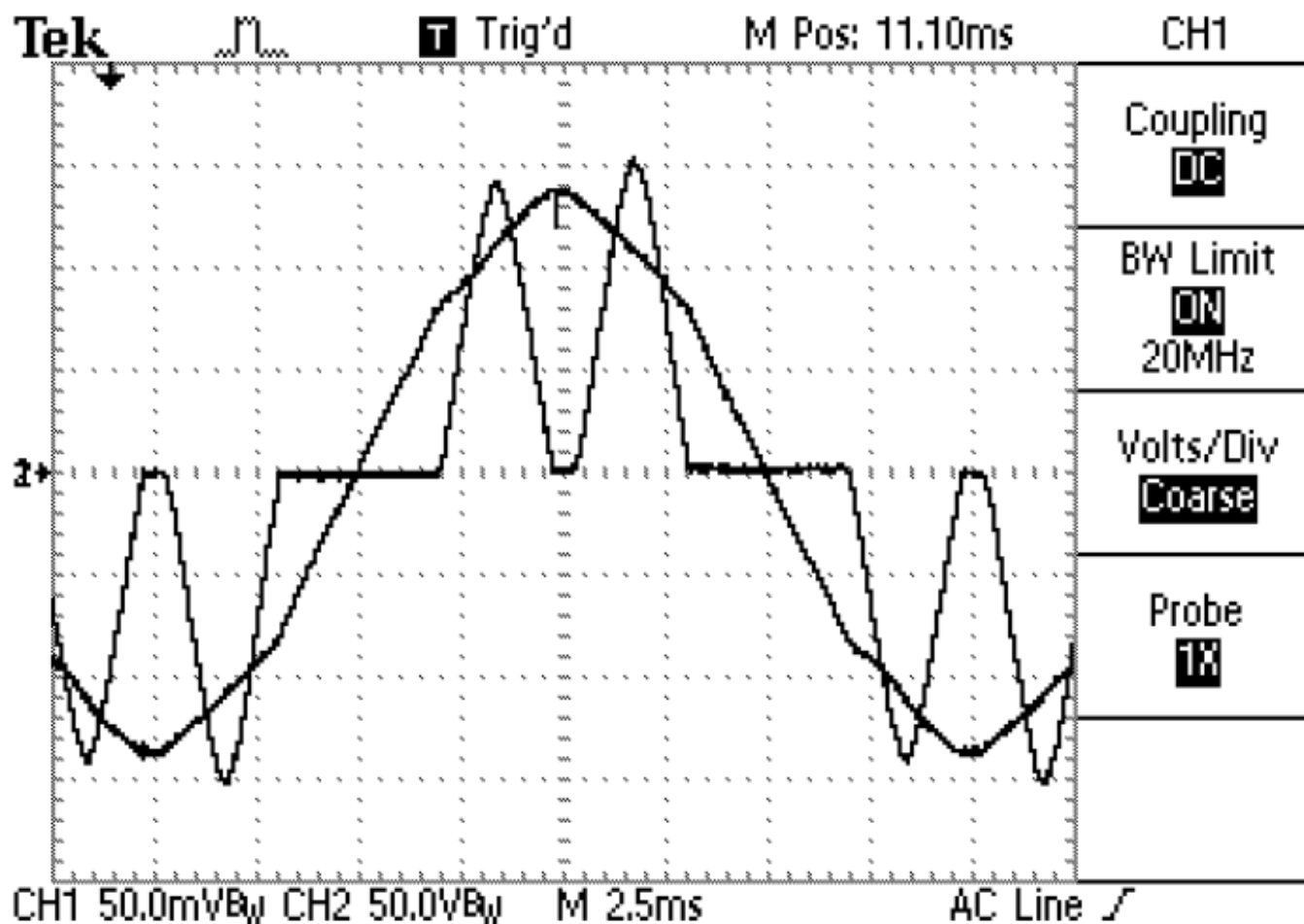
konverzija različitih oblika električne energije

ulaz	izlaz	konvertor
DC	DC	DC/DC konvertori
AC	DC	ispravljači
DC	AC	invertori
AC	AC	ciklokonvertori

O čemu će biti reči?

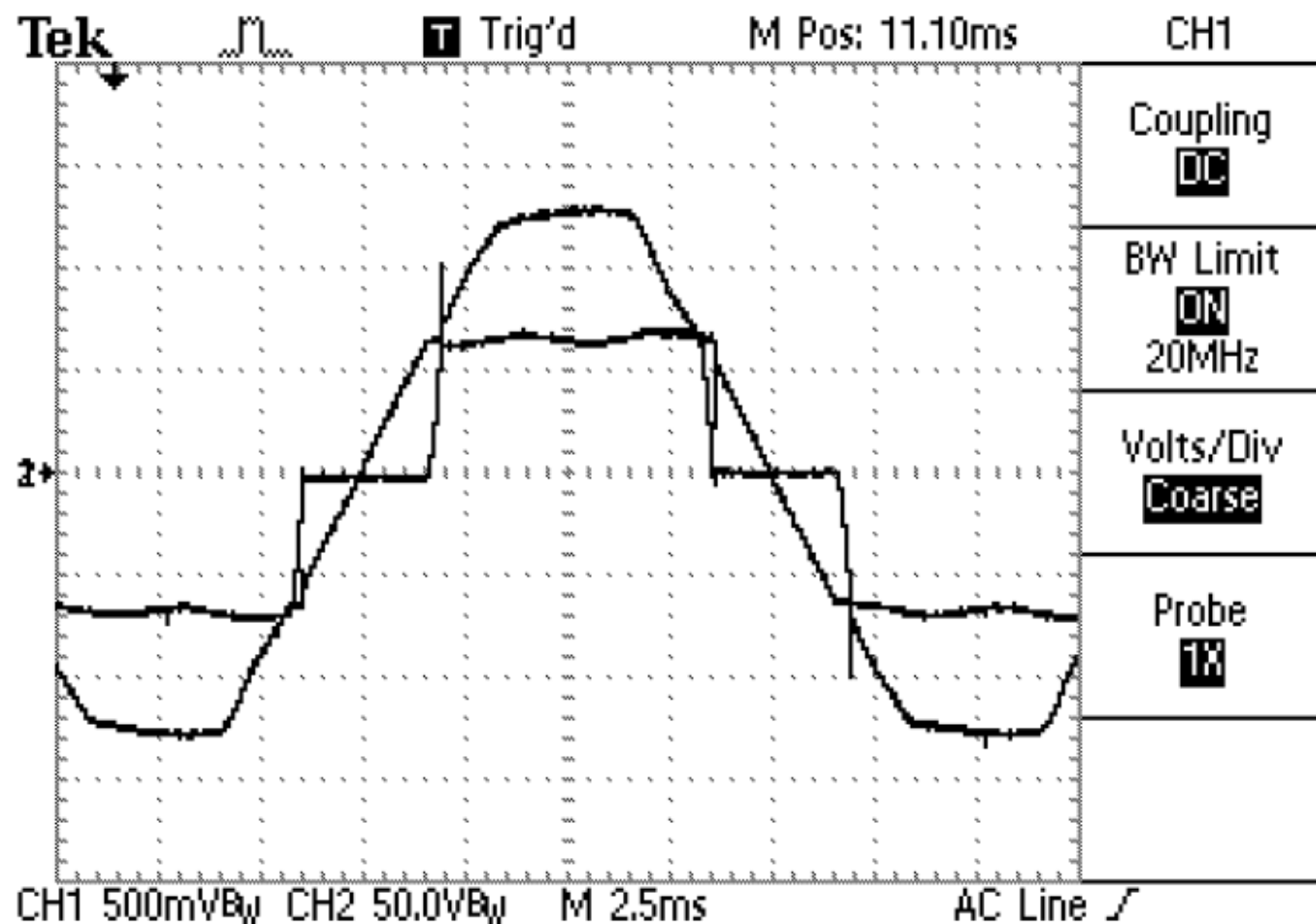
- strukture konvertora
- komponente (L, T, C)
- upravljanje
- merenje
- primena

# primer 1: trofazni ispravljač sa kapacitivnim filtrom



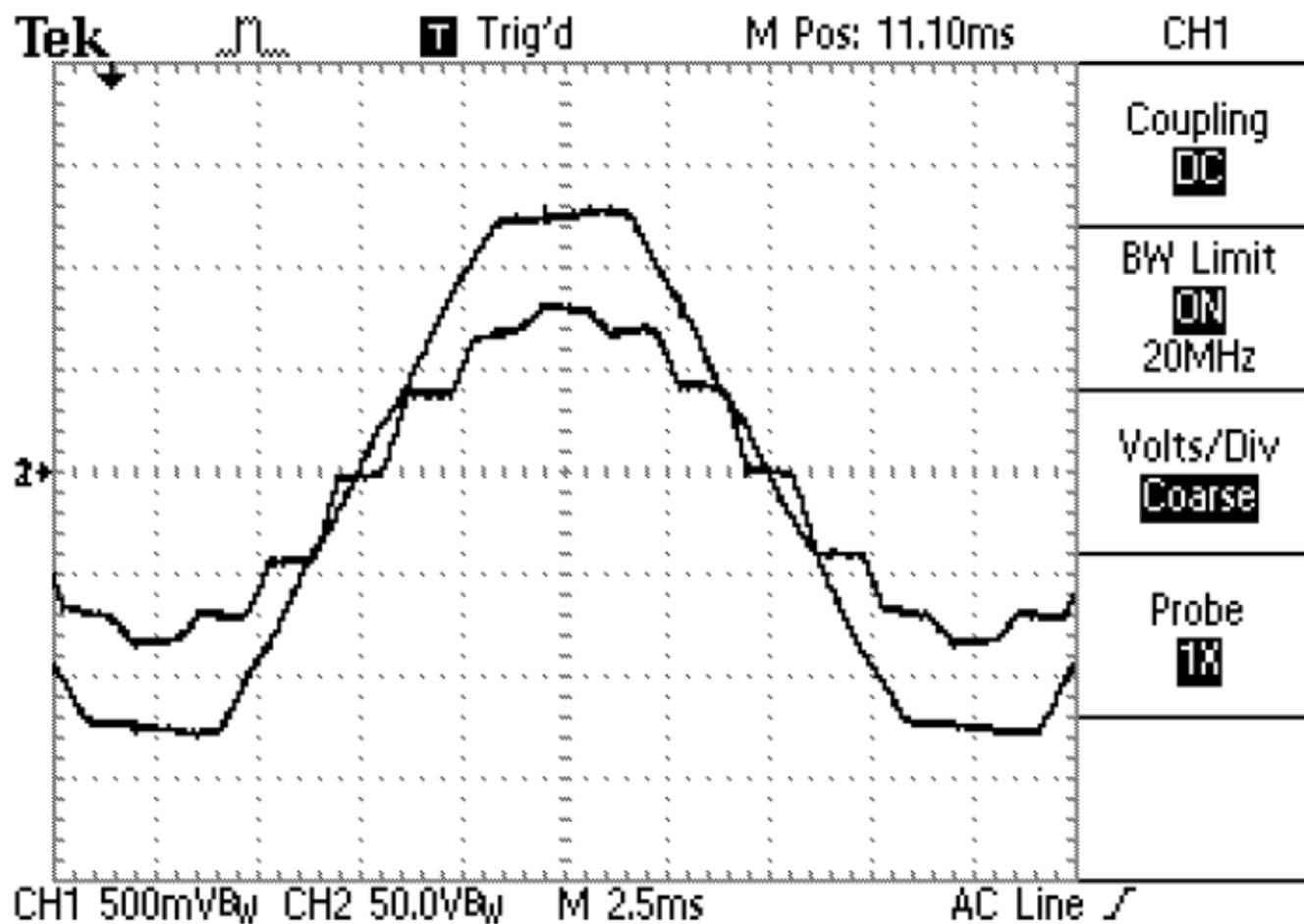
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# primer 2: trofazni ispravljač sa L filtrom



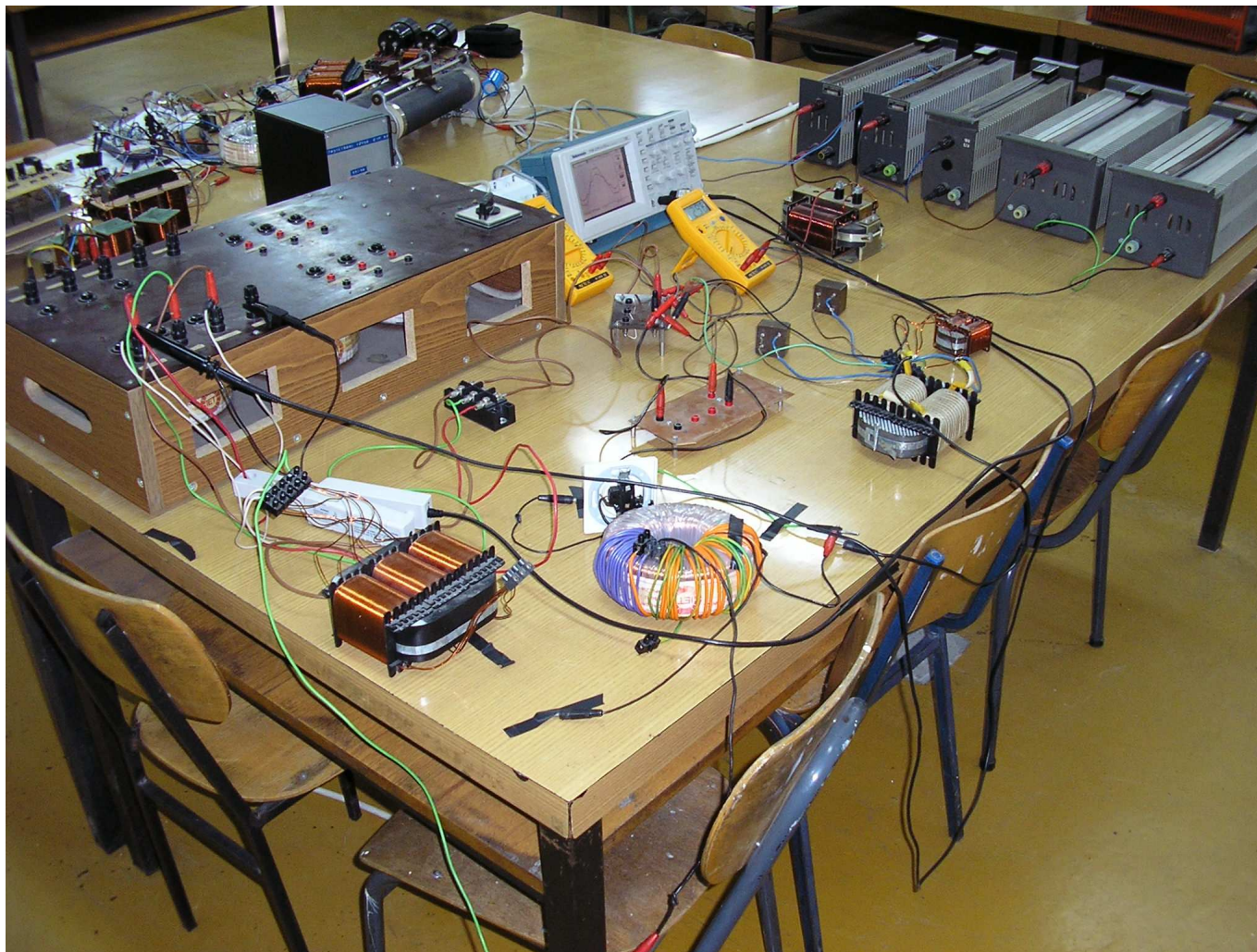
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# primer 3: "multipulse" trofazni ispravljač



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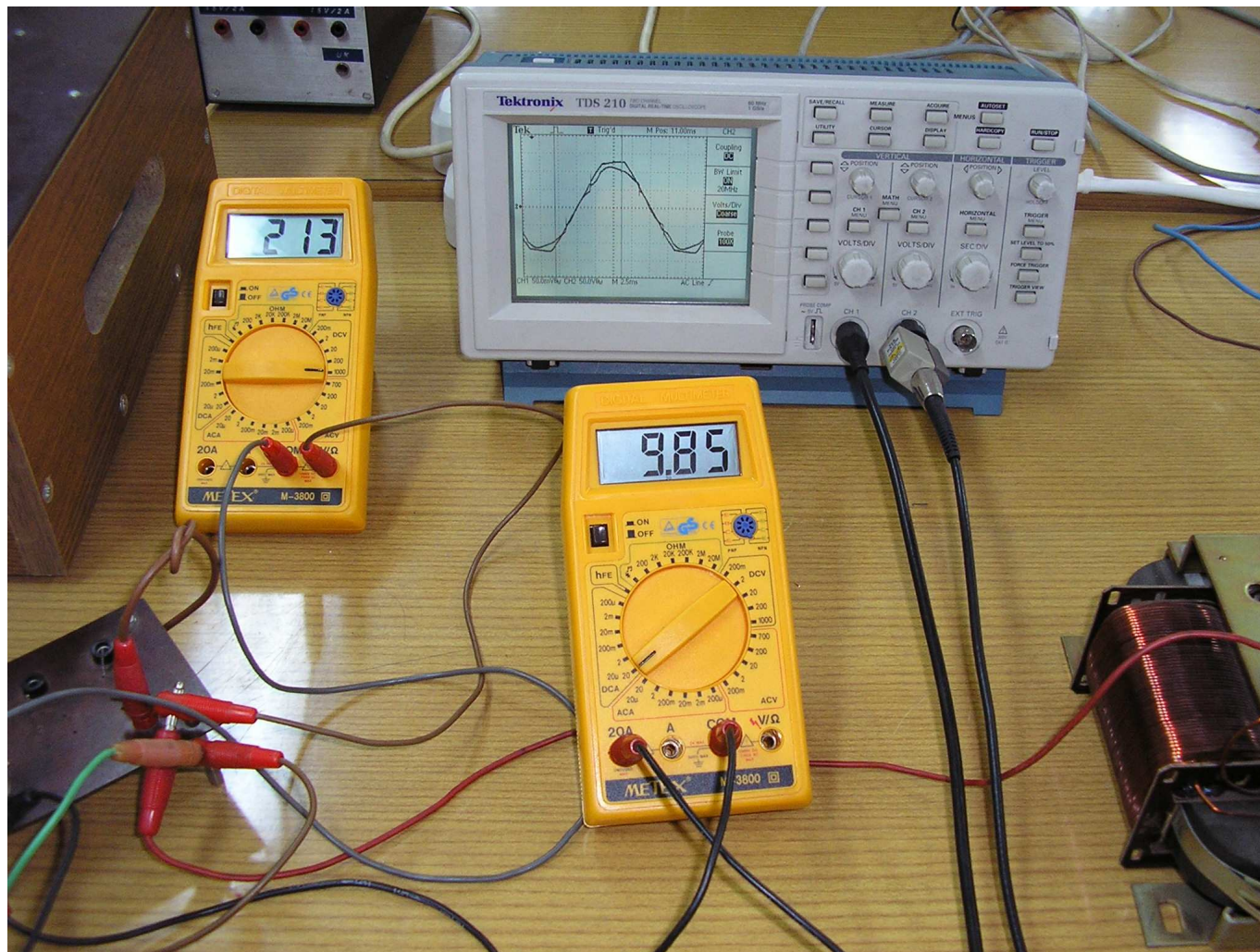
kako to izgleda?



kako to izgleda?



kako to izgleda?



## Two Three-Phase High Power Factor Rectifiers that Apply the Third Harmonic Current Injection and Passive Resistance Emulation

Predrag Pejović, *Member, IEEE*

**Abstract**—Two high power factor rectifiers that apply the third harmonic current injection principle and passive resistance emulation are presented in this paper. Two methods of current injection, simultaneous current injection in all three of the phases, and current injection to only one of the phases, are discussed. Conditions for the optimal third harmonic current injection are derived. Structures of the rectifiers that apply passive resistance emulation, enabling recovery of the power taken by the current injection network, are presented. Proposed resistance emulator consists of a transformer, two diodes and a capacitor. Choice of the passive components is discussed, and their values are proposed. Volt-ampere ratings of the magnetic components are derived. Influence of the higher order harmonics is discussed. Dependence of the input current total harmonic distortion on the load level is presented for both of the current injection methods. Analytically obtained results are verified on 1.5 kW experimental rectifiers.

**Index Terms**—AC–DC power conversion, converters, harmonic

To avoid mentioned drawbacks of the third harmonic current injection rectifiers, application of a novel passive resistance emulation network is proposed in this paper. Topological inspiration for the passive resistance emulation is found in [6], where a rectifier connected in series with the load, and coupled by a transformer to the current injection path, is applied. However, the rectifier of [6] is not a true current injection rectifier, but rather a current injection version of a 12 pulse rectifier.

In contrast to the multipulse approach of [6], smooth current injection is applied in the rectifiers proposed in this paper. Concept of the rectifier connected in series with the load [6], coupled to the current injection path by a transformer, is applied as a resistance emulator. Injected current is filtered, resulting in low distortions of the input currents. Huge capacitors of [6] are avoided. Almost

# ISPIT:

- pismeni, iz jednog dela
- kolokvijum može da zameni 50% ispita
- laboratorijske vežbe
- prolaznost?