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THE INFLUENCE REGULATED VIBRATORY CONVEYING DRIVES ON THE MAINS POWER

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Abstract: *Influence of regulated electromagnetic vibratory conveying drive (VCD) is presented in this paper. Applying electromagnetic vibratory actuator in combination with power converter it is reached the flexibility during the work. SCR converters are used for the electromagnetic vibratory actuator (EVA) standard power output stage. Their usage implies a phase angle control in full-wave and half-wave modes. Because, the frequency of the main power voltage is constant, by varying the firing angle it is possible to control AC or DC injection current to control mechanical oscillations amplitude, but it is not possible to tuning their frequency. Another way to producing a sine full-wave (or half-wave) injection current is to use switch mode power converters (SMPC). Only then, driving for EVA does not depend on mains frequency. It is possible to adjust frequency and pulse intensity of the excitation force. It is also possible to reach operation VCD in the region of the mechanical resonance frequency. The resonance frequency is the most efficient, because large output displacement is provided by small input power. On the basis experimental results it is prove that VCD with both SCR and SMPC have very poor power factor. These converters inject undesirable harmonics components and DC current component into mains supply. A something better situation is realized in the case of using triacs. The drives with SMPC generate mostly AC pulse of currents, but under special condition they can produce DC pulsating impulses. Consequently the both category of the regulated VCD represents a significant source parasitic high harmonics, which adversely affect on the operating other consumers. The effect for main power is more drastic for using more power converters and vibratory conveying drives. In fact, this is more often case in practice, whereas conveying process line is feed from numerous conveying devices for forming definitive mixture demanded homogeneous.*

Key words: Vibratory-conveying drives (VCD), electromagnetic vibratory actuator, thyristor, power factor, current conrol, switching converters, IGBT.

UTICAJ REGULISANIH VIBRACIONO-TRANSPORTNIH POGONA NA NAPOJNU MREŽU

Sadržaj rada: *U radu se razmtra uticaj regulisanih elektromagnetnih vibraciono-transportnih pogona (VTP) na napojnu mrežu. Primenom elektromagnetnih vibracionih aktuatora (EVA) i pripadajućih energetskih pretvarača je postignuta fleksibilnost celokupnog VTP u eksploataciji. Upotreba tiristorskih (trijačkih) pretvarača podrazumeva korišćenje fazne kontrole.Obzirom da je učestanost napojne mreže fiksna, promenom faznog ugla, moguće je postići podešavanje amplitude mehaničkih oscilacija, ali ne i njihove učestanosti. Upotreba prekidačkih pretvarača pored amplitudske obezbeđuje i frekventnu kontrolu VTP. Frekventna kontrola omogućava rad pogona u oblasti mehaničke rezonance. Rad u rezonantnom opsegu je energetski povoljan, pošto se tada ima minimalna potrošnja energije iz mreže. Na osnovu eksperimentalnih i simulacionih rezultata u radu je pokazano, da i pored pomenutih prednosti VTP imaju jako loš ukupni faktor snage. Tiristorski pogoni generišu DC komponentu struje koja se prenosi u napojnu mrežu. Nešto bolja situacija je u slučaju upotrebe trijaka. Pogoni sa prekidačkim pretvaračima generišu u mrežu uglavnom bipolarne impulse struje, ali pod određenim uslovima mogu generisati i DC pulsirajuće impulse. Usled ovoga obe klase regulisanih VTP predstavljaju značajan izvor štetnih, viših harmonika koji nepovoljno utiču na rad ostalih potrošača. Efekat na mrežu je još drastičniji ukoliko se iz nje napaja više regulisanih pogona. Upravo je u praksi to najčešći slučaj, pošto se iz tehnoloških razloga procesna linija "hrani" materijalom iz većeg broja transportnih uređaja, radi formiranja konačne smeše zahtevane homogenosti.*

Ključne reči: Vibraciono-transportni pogoni (VTP),, elektromagnetni vibracioni aktuator, tiristor, faktor snage, strujna kontrola, prekidački pretvarači, IGBT.