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ISTRAŽIVANJE UTICAJA STEPENA KOMPRESIJE NA RADNI PROCES DIZEL MOTORA

(Analyzing the Impact of Variable Compression Ratio on Combustion Process in Diesel Engines)

– Magistarska teza – (M. Sc. Thesis)

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SADRŽAJ (The Content):

"ISTRAŽIVANJE UTICAJA STEPENA KOMPRESIJE NA RADNI PROCES DIZEL MOTORA"

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REZIME

Dizel motori imaju dobru ekonomičnost i nisku emisiju ugljen–dioksida. Primenom savremenih tehničkih rešenja, ostvaren je rad dizel motora sa niskom emisijom oksida azota i čestica, tako da oni zadovoljavaju zakonske propise o dozvoljenoj emisiji štetnih produkata sagorevanja, bez pogoršanja njihove dobre ekonomičnosti.

Zbog toga se ekonomični dizel motori sve više koriste za pogon putničkih vozila, u kojima su do sada dominirali benzinski motori.

U klasičnim motorima, stepen kompresije je konstantan i njihove performanse su, zbog toga, posledica kompromisa između različitih zahteva.

Osnovni problemi svih pogonskih agregata u vozilima su da efikasno rade u promenljivim režimima i u različitim ambijentalnim uslovima. Ako dizel motor ima konstantan stepen kompresije, bira se najmanja vrednost koja obezbeđuje pouzdano samoupaljenje kada se startuje motor u uslovima hladnog starta.

U dizel motorima, promenljiv stepen kompresije obezbeđuje kontrolu i upravljanje nad maksimalnim pritiskom u cilindru, smanjenje potrošnje goriva i povećanje specifične izlazne snage kada se koristi natpunjenje. Dalje, promenljiv stepen kompresije poboljšava hladnu vozivost, rad na niskim opterećenjima, višegorivost, ekonomičnost goriva i dovodi do smanjenja emisije štetnih produkata sagorevanja. Naročito je moguće smanjenje emisije azotovih oksida na visokim opterećenjima, kada se automatski smanji vrednost stepena kompresije. Automatskom promenom stepena kompresije smanjuju se normalna opterećenja kliznih parova u motoru a time i mehanički gubici, što rezultira smanjenjem potrošnje goriva.

U radu su prikazani rezultati sopstvenih teorijskih i eksperimentalnih istraživanja promenljivog stepena kompresije na parametre radnog procesa dizel motora. Ilustrovane su i kritički razmatrane različite metode uvođenja promenljivog stepena kompresije, uz navođenje savremenih tehničkih rešenja u oblasti dizel motora, i zakonskih propisa koje oni moraju zadovoljiti.

ABSTRACT

Diesel engines have good economy and low carbon emissions. By applying modern technical solutions, the operation of diesel engines with low emission of nitrogen oxides and particles has been achieved, so that they meet the legal regulations on the permitted emission of harmful combustion products, without deteriorating their good economy.

As a result, fuel-efficient diesel engines are increasingly being used to power passenger vehicles, which have so far been dominated by petrol engines.

n classic engines, the compression ratio value is constant and their performance is, therefore, a consequence of a compromise between different requirements.

The basic problems of all propulsion units in vehicles are that they work efficiently in changing modes and in different ambient conditions. If the diesel engine has a constant compression ratio, the lowest value is selected that provides reliable self-ignition when starting the engine in cold start conditions.

In diesel engines, variable compression ratios provide control and management of maximum cylinder pressure, reduced fuel consumption and increased specific power output when refueling is used. Furthermore, the variable compression ratio improves cold driving, operation at low loads, multi-fuel, fuel economy and leads to a reduction in emissions of harmful combustion products. It is especially possible to reduce the emission of nitrogen oxides at high loads, when the value of the compression ratio is automatically reduced. Automatic change of compression ratio reduces normal loads of sliding pairs in the engine and thus mechanical losses, which results in reduced fuel consumption.

The paper presents the results of our own theoretical and experimental investigations of the variable compression ratio on the operating parameters of a diesel engine. Different methods of introducing variable compression ratio are illustrated and critically considered, with the indication of modern technical solutions in the field of diesel engines, and legal regulations that they must meet.

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