GAZBALLONLI TA’MINLASH TIZIMIGA EGA DVIGATEL BILAN JIHOZLANGAN AVTOMOBILLARNI EKSPLUATATSIYA JARAYONI TAHLILI

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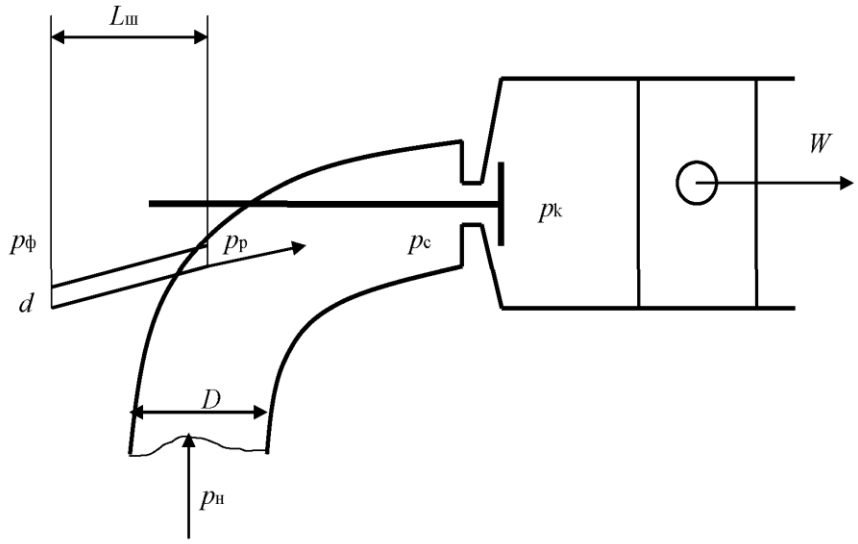
ANNOTATSIYA

Ushbu maqolada O’zbekiston mintaqasida zamonaviy avtomobillarda qo'llaniladigan gazballonli ta’minlash tizimiga ega dvigatel silindrlarining to’ldirilish xususiyatlarini yaxshilash imkoniyatlari keltirilgan.

Kalit so'zlar: Gaz balloni, ta'minot tizimi, siqilgan gaz, uskuna, uskunalar, gaz apparaturasi, bosim, neft gaz, yonuvchi diod.

Ma’lumki, gaz yonilg‘isida ishlaydigan ichki yonuv dvigatellari, quvvatini va aylanish momentini 20-28% miqdorda yo‘qotadi. Bu holat ob’ektiv sabablarga ko‘ra, silindrlarni havo bilan to‘lishi yomonlashuviga bog‘liq; metan va havo uchun hajmiy stexi ometriya koeffitsiyenti 9,53 ga teng bo‘ladi. Bu ichki yonuv dvigateli silindri hajmining deyarli 10% ni gaz yonilg‘isi va 90% ni havo egallashidan dalolat beradi. Shunga muvofiq bezinda ishlaydigan dvigatelga nisbatan quvvati va aylanish momentining minimal darajada pasayishi 10% tashkil etadi. Shunga ko‘ra gazda ishlaydigan dvigatellarning quvvatini va aylanish momentini minimal vositalar yordamida (turbo va elektrprivodlar silindriga purkash, dam berish uchun kompressorlardan foydalanmay turib) oshirishga erishish vazifasi kelib chiqadi [21].

Siqilgangazda ishlaydigan avtomobillarni sinovdan o‘tkazish natijalari forsunkalardagi havo oqimi bo‘ylab gaz yonilg‘isi yuboriladigan shtutserlar o‘rnatilganda, samarali quvvati va aylanish momenti ancha (tirsakli valning aylanish chastotasiga bog‘liq holda 2% dan 10% gacha) oshganligini ko‘rsatadi. Quyida hisoblash sxemasi keltirilgan.



1-rasm. Gaz yonilg‘isi purkalgandagi kiritish sistemaning hisoblash sxemasi

Bu yerda:

P_f-gaz forsunkasi ortidagi bosim;

P_r-IYoD kiritish quvuriga gaz berilishida trubkadan chiqayotgan gazning bosimi;

P_n-dvigatelning kiritish trubasidagi havoning bosimi;

P_s-ejektor orqasidagi kiritish quvurdagi yonilg‘i aralashmasining bosimi;

P_k-yonilg‘i aralashmasi so‘rilishi jarayonida yonish kamerasidagi bosim;

L- trubka gaz forsunkasining konus naychasi (soplo)dan IYoD ning kiritish quvuriga kirguncha bo‘lgan uzunligi (masalan, 200 mm);

d-gaz trubkasini IYoD ning kiritish quvuriga kirish joyidagi ichki diametri (masalan, 4 mm);

D- kiritish havo quvurining ichki diametri (masalan, 50 mm);

Nazariy asoslash uchun ichki yonish kamerasi kiritish klapani ochiqligi momentida gaz yonilg‘isi purkalishi uchun forsunkalarning optimal xarakteristikasini tanlash maqsadida hisoblash modeli ishlab chiqilgan.

Gaz forsunkalaridagi bosim har xil darajada pasayganda, berilgan geometriya va ejeksiya darajasi uchun ejektorni hisoblash:

1. Tirsakli valning aylanish chastotasiga bog‘liq holda, havo–yonilg‘i aralashmasi surilishi jarayonida porshenning harakatlanish tezligining aniqlash. Tezligining tirsakli valning holati burchagiga va uning aylanish chastotasiga bog‘liq egriliklarni hosil qilish [22].

Porshenning harakatlanish tezligi:

$$W=R_{sh}\omega(\sin\alpha+0{,}5\delta\sin 2\alpha)$$

Bu yerda:

R_{sh}-shatun bo‘yni (sheykasi)ning tirsakli val o‘qiga yoki porshenning ishlashiga nisbatan aylanish radiusi;

α-tirsakli valning yuqori qo‘zg‘almas nuqtasidan boshlangan burchak holati;

ω-tirsakli valning burchak tezligi;

δ-krivoshipning radiusining shatun uzunligiga nisbati (yaqin hisob uchun 0,3 ni olamiz).

2. Gaz-havo aralashmasini tirsakli valning aylanish chastotasiga, kiritish klapandagi harakatlanish qarshiligi koeffitsiyentini olishga va oqimining aylanishiga, shuningdek drossel (qopqoq) ning holatiga bog‘liq holda gaz -havo aralashmasini sarflanish egriligi seriyasini tuzib, havo-yonilg‘i aralashmasining porshen harakatlanish tezligining (A_W) tezligiga teng bo‘lgan bir lahzali liniyasi vertikal harakatlanish tezligini qabul qilamiz.

A=1-(cosα)/10 koeffitsiyenti o’t oldirish jarayoni uchastkasida havo-yonilg‘i aralashmasi tezligining ortishi o’t oldirish jarayoni dan keyin 90 gacha kechikishini ko‘rsatadi va kiritish klapanning ko‘ndalang kesimiga hamda soniga bog‘liq bo‘ladi.

Silindrga kiradigan havo-yonilg‘i ar alashmasining maksimal miqdori silindrning va to‘lish koeffitsiyentiga bog‘liq bo‘lib, u ham o‘z navbatida tirsakli valning aylanish chastotasiga va boshqa ko‘p parametrlarga bog‘liq. Silindrga kirayotgan havo-yonilg‘i aralashmasining tashkil topgan barcha integral massasi so‘rilish jarayonida o’t oldirish jarayoni dan boshlab, taxminan sinus qonuniga muvofiq taqsimlanadi [20].

Silindrga kirayotgan havo-yonilg‘i aralashmasining massasi quyidagicha:

$$M = V_k \cdot P_{TBC}$$

Bu yerda:

V-silindrning hajmi;

k-tirsakli valning aylanish chastotasiga bog‘liq holda silindrni to‘ldirish koeffitsiyenti;

P_{TBC}- havo-yonilg‘i aralashmasining zichligi.

Shuning uchun havo-yonilg‘ili gaz aralashmasining tez sarflanishiquyidagiga teng bo‘ladi:

$$dG_B = (dM/dt) \sin\alpha\,(1-(\cos\alpha)/10)$$

Yoki o’t oldirishdan boshlab, tirsakli valning joylashish burchagi bo‘yicha:

$$dG_B = (dM/d\alpha) \sin\alpha\,(1-(\cos\alpha)/10)$$

Havo-yonilg‘i aralashmasining sarflanishi bo‘yicha uning harakatlanish tezligini aniqlaymiz:

$$dW_k = (dG_B/d\alpha / (\mu \cdot \rho_{tvc} \cdot F_K)$$

bu yerda: F_k-kiritish klapan kesimining maydoni.

μ -sarflash koeffitsiyenti (shaybalar uchun, odatda 0,6 dan 0,7 gacha).

Kiritish klapandagi to‘liq bosimning yo‘qolishini hisoblab topamiz:

$$\Delta p_K = p_C - p_K = \xi \rho_{tvc} (dW_K)^2/2$$

bu yerda: ξ-shayba qarshiligi koeffitsiyenti.

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