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VISCOELASTIK DAMPERLAR BILAN SEYSMIK HIMOYANI TA'MINLASH: ISHLASH PRINSIPLARI VA QO'LLANILISHI

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ARTICLEINFO.

Kalit so'zlar: viskoelastik damperlar, suyuq VE qurilmalar, qattiq VE damperlar, suyuq viskoz damperlar, elastomerik prujinali damperlar.

Annotatsiya

Viscoelastik damperlar (VE dampers) binolar va inshootlarning seysmik chidamliligini oshirishda samarali vosita sifatida keng qo'llanilmoqda. Ushbu qurilmalar, o'zining viskoz va elastik xususiyatlari tufayli, tebranish energiyasini yutish va yoyish orqali inshootlarning seysmik ta'sirlarga qarshiligini sezilarli darajada oshiradi. Ushbu maqola viscoelastik damperlarning ishlash prinsiplari, ularning seysmik himoyadagi roli va ularni turli binolarda qo'llash amaliyotini o'rganishga bag'ishlangan.

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Viscoelastik damperlarning ishlash prinsipi

Viscoelastik damperlar o'zining elastik va viskoz xususiyatlari orqali tebranishlarni samarali boshqaradi. Viskoz xususiyatlari tufayli, ular yuqori tezlikda tebranish energiyasini yutadi, elastik komponent esa inshootga ta'sir etgan kuchni elastik tarzda boshqaradi. Bu qurilmalar harakatlanish chastotasiga bog'liq holda qattiqlik va damping koeffitsientiga ega bo'lib, ularning samaradorligi ushbu parametrlarga asoslangan.

Viscoelastik damperlarning turlari

Viscoelastik damperlarning turli turlari mavjud:

1. **Qattiq VE damperlar**: Ushbu damperlar polimerlar yoki akril kopolimerlar qatlamlaridan tashkil topgan bo'lib, tebranish kuchlarini kesish deformatsiyalari orqali yutadi.

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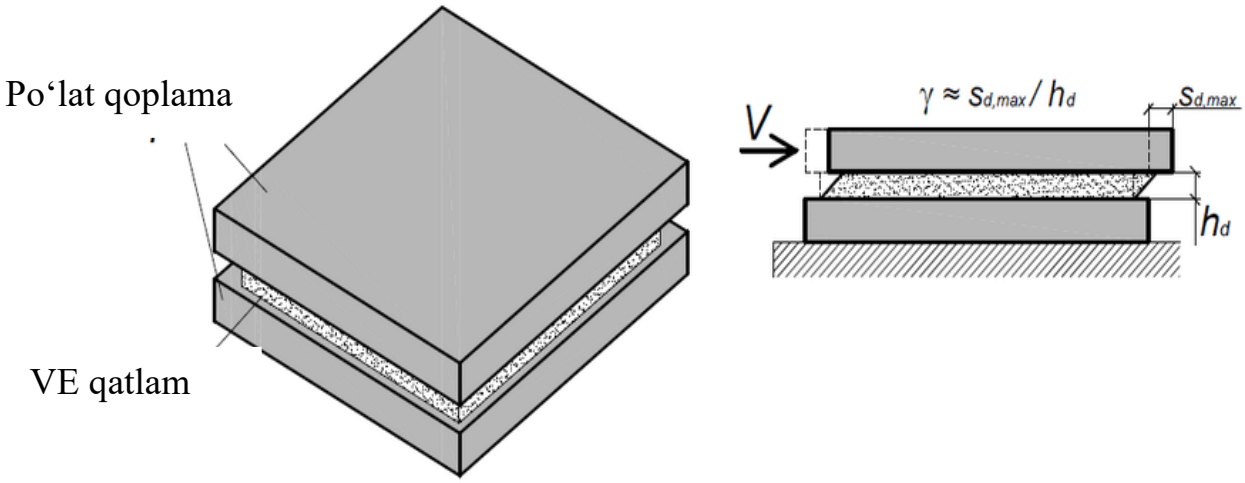
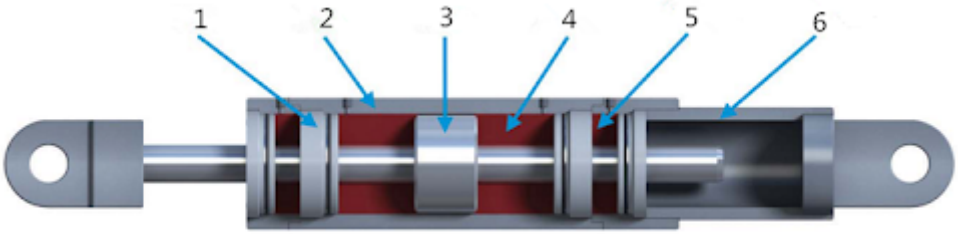


1-rasm. Qattiq viscoelastik damper

2. **Suyuq VE qurilmalar**: Viskoz suyuqliklar orqali ishlaydigan damperlar, ular kesish orqali energiya yutish qobiliyatiga ega va past chastotali yuklamalarda sezilarli qattiqlikka ega emas.



2-rasm. Suyuq viscoelastik damper

1 -Old qopqoq, 2 - Tsilindr bloki, 3 – Porshen, 4 - Damping vositasi, 5 - Yog’ yetkazib berish tanki, 6 - Ulagich

3. **Suyuq viskoz damperlar**: Suv oqimi orqali ishlaydigan bu damperlar keng chastotali yuklamalarda katta miqdorda energiya yutadi.
4. **Elastomerik prujinali damperlar**: Ushbu damperlar prujinali elastik komponentlar orqali ishlaydi va yuqori chastotali yuklamalarda samarali hisoblanadi.

Viscoelastik damperlarni qo‘llash

Viscoelastik damperlar ko‘pincha kesish deformatsiyasiga ta’sir etuvchi inshootlarda qo‘llaniladi. Ular po‘lat va beton konstruksiyalarni tebranishlardan himoya qilishda keng qo‘llaniladi. Misol uchun, Showa va Shimizu korporatsiyasi tomonidan ishlab chiqilgan bitumli kauchukdan tayyorlangan damperlar juda katta kesish deformatsiyalarini yutishga qodir bo‘lib, inshootning seysmik javobini 50% ga kamaytirgan. Kumagai-Gumi korporatsiyasi tomonidan sinovdan o‘tgan superplastik silikon kauchuk damperlari esa javobni 60% gacha kamaytirgan.

Afzalliklari va kamchiliklari

Viscoelastik damperlarning asosiy afzalliklari quyidagilardan iborat:

- **Yuqori energiya yutish qobiliyati**: Bu damperlar inshootning seysmik yuklamalariga chidamliligini oshiradi.
- **Turli sohalarda qo‘llash imkoniyatlari**: Ular turli xil konstruksiyalar va yuklash sharoitlarida samarali qo‘llanilishi mumkin.

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Kamchiliklari esa murakkab dizayn va o‘rnatish talablarini o‘z ichiga oladi. Masalan, suyuq viskoz damperlar katta kuchlar bilan ishlashda qiyinchiliklarga duch kelishi mumkin, va bu konstruksiyalarning barqarorligini ta’minlashni qiyinlashtiradi.

Xulosa: Viscoelastik damperlar zamonaviy seysmik himoya texnologiyalari qatorida muhim o‘rin tutadi. Ularning yuqori samaradorligi va turli inshootlarda qo‘llash imkoniyatlari ularni zamonaviy qurilishda samarali vositaga aylantiradi. Shu bilan birga, dizayn va o‘rnatishdagi murakkabliklar texnologiyaning qo‘llanish imkoniyatlarini cheklashi mumkin.

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