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Constructions for large spatial point-line (n_k) congruations

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Abstract

Highly symmetric figures, such as regular polytopes, can serve as a scaffolding on which spatial (n_k) point-line configurations can be built. We give several constructions using this method in dimension 3 and 4. We also explore possible constructions of point-line configurations obtained as Cartesian products of smaller ones. Using suitable powers of well-chosen configurations, we obtain infinite series of (n_k) configurations for which both n and k are arbitrarily large. We also combine the method of polytopal scaffolding and the method of powers to construct further examples. Finally, we formulate an incidence statement concerning a (100_4) configuration in 3-space derived from the product of two complete pentalaterals; it is posed as a conjecture.

Keywords

spatial congruence, Platonic solid, regular 4-polytope, product of congruences, incidence statement

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Konstrukcije velikih prostorskih (n_k) konguracij točk in premic

Povzetek

Objekti z mnogo simetrijami, kot npr. regularni politopi, lahko služijo kot izhodišče za tvorjenje (n_k) konfiguracij točk in premic. Podamo različne konstrukcije z uporabo te metode v dimenzijah 3 in 4. Raziskujemo tudi možne konstrukcije konfiguracij točk in premic, ki so dobljene kot kartezični produkti manjših. Z uporabo primernih potenc pametno izbranih konfiguracij dobimo neskončno družino (n_k) konfiguracij, pri katerih sta tako n in k poljubno velika. S kombiniranjem metode konstruiranja politopov iz danega izhodišča in metode potenc konstruiramo nadaljnje primere. Članek zaključimo z incidenčno izjavo o (100_4) konfiguraciji v 3-prostoru, dobljeni kot produkt dveh polnih petkotnikov; formuliramo jo v obliki hipoteze.

Ključne besede

Prostorska konfiguracija, platonsko telo, regularni 4-politop, produkt konfiguracij, incidenčna izjava

