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Existential Closure of Block Intersection Graphs of Infinite Designs

We extend the study of the n-existential closure property of block intersection graphs (BIGs) of designs to infinite designs. An infinite design is a design with an infinite number of points while k, t and λ can be either finite or infinite.

If $\lambda = 1$ we show that the BIG of an infinite design is n-$e.c.$ if and only if $n \leq \min\{t, \lfloor \frac{k-1}{t-1} \rfloor + 1\}$. If $\lambda \geq 2$, then the BIG of a design is 2-$e.c.$, it is not n-$e.c.$ for any $n \geq \min\{t+1, \lceil \frac{k}{t} \rceil + 1\}$, and it is not necessarily 3-$e.c.$ Our results show that BIGs of infinite designs with finite k and λ are different from countably infinite random graphs; countably infinite random graphs are n-$e.c$ for any positive integer n, while n is bounded for the n-existential closure property of the BIGs of infinite designs.

This is joint work with David A. Pike (email: `dapike@mun.ca`).