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Ideal ramp schemes and related combinatorial objects

In 1996, Jackson and Martin proved that a strong ideal ramp scheme is equivalent to an orthogonal array. However, there was no good characterization of ideal ramp schemes that are not strong. Here we show the equivalence of ideal ramp schemes to a new variant of orthogonal arrays that we term *augmented orthogonal arrays*. We give some constructions for these new kinds of arrays, and, as a consequence, we also provide parameter situations where ideal ramp schemes exist but strong ideal ramp schemes do not exist.