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**INFERENCE FOR RANDOM EFFECTS  
IN PRIME BASIS FACTORIALS USING  
COMMUTATIVE JORDAN ALGEBRAS**

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**Abstract**

Commutative Jordan algebras are used to drive an highly tractable framework for balanced factorial designs with a prime number  $p$  of levels for their factors. Both fixed effects and random effects models are treated. Sufficient complete statistics are obtained and used to derive UMVUE for the relevant parameters. Confidence regions are obtained and it is shown how to use duality for hypothesis testing.

**Keywords:** prime basis factorial, commutative Jordan algebras, complete sufficient statistics, UMVUE, confidence regions.

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