ON OPTIMAL THIRD ORDER ROTATABLE DESIGNS

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Abstract. We obtain results for choosing optimal third order rotatable designs for the fitting of a third order polynomial response surface model, for $m \geq 3$ factors. By representing the surface in terms of Kronecker algebra, it can be established that the two parameter family of boundary nucleus designs forms a complete class, under the Loewner matrix ordering. In this paper, we first narrow the class further to a smaller complete class, under the componentwise eigenvalue ordering. We then calculate specific optimal designs under Kiefer's ϕ_p-criteria (which include the often used E-, A-, and D-criteria). The E-optimal design attains a particularly simple, explicit form.

Key words and phrases: Complete classes of designs, design efficiency, E-, A-, D-optimal designs, response surface designs, third order models.