

## On the Asymptotic Existence of Complex Orthogonal Designs

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For every odd integer  $p$ , we show that there are two integers  $\alpha(p)$  and  $\beta(p)$  such that there is a *complex Goethals-Seidel type array* of order  $p(2^{\alpha(p)})$  in  $\beta(p)$  *free* variables. The arrays found have block circulant structure and most have the maximum number of possible free variables. As a corollary this presents a new approach to the asymptotic existence of complex and thus real Hadamard matrices. We will compare  $\alpha(p)$  with other known functions.