The Hadamard maximal determinant problem

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Hadamard's famous paper of 1893 discusses complex matrices which meet his bound with equality. Slightly less well known is the body of work on matrices with entries in $\{-1, 1\}$ with maximal determinant. These are typically not Hadamard, since the Hadamard bound cannot be achieved when the dimension is larger than 2 and not a multiple of 4. I will survey the main techniques, bounds and constructions to be found in the literature, highlighting recent progress.

While the analogous complex Hadamard matrices (particularly with k^{th} roots as entries) have been well studied, much less is known about complex maximal determinant matrices (over a fixed finite extension of the rationals) when the bound is not attained. I will present some open questions and directions for future research.

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