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Real line arrangements and surfaces with many real nodes. (English summary)

Geometric modeling and algebraic geometry, 47–54, Springer, Berlin, 2008.

To paraphrase the authors' summary, the following question is considered: Can the maximum number $\mu(d)$ of nodes on a surface of degree d in $\mathbb{P}^3(\mathbb{C})$ be achieved by a surface defined over the reals which has only real singularities? The best known asymptotic lower bound $\frac{5}{12}d^3$ for $\mu(d)$ provided by Chmutov's construction [S. V. Chmutov, J. Algebraic Geom. **1** (1992), no. 2, 191–196; [MR1144435 \(92k:14016\)](#)] gives surfaces whose nodes have non-real coordinates. Using explicit constructions of certain real line arrangements, the authors show that Chmutov's construction can be adapted to give only real singularities. Also, all known constructions which exceed Chmutov's lower bound (for $d = 3, 4, \dots, 8, 10, 12$) are shown to be realized with only real singularities. It is shown that the real line arrangements considered are asymptotically the best possible ones for constructing surfaces with many nodes.

{For the entire collection see [MR2385140 \(2008i:65029\)](#)}

Reviewed by *Murray Marshall*

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