Optimal disk packings in the square

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To find the densest packing for n equal and non-overlapping circles in a square, is a well-known problem in discrete geometry. An equivalent continuous global optimization problem to locate n points in a square, such that the minimal distance m between any two of them is maximal. Currently the optimal solutions of this problem are known for the 1-27 and 36 circles cases. Good packings, the best known arrangements, are available up to 200 circles (see e.g. at

`http://www.inf.u-szeged.hu/~pszabo`).

In our talk, we give a short review on the previous results of the problem and some new patterns and similar structures of packings found by a new stochastic algorithm. For all packings a corresponding minimal polynomial can be defined, the smallest positive root of which is m, and the degree of the polynomial is minimal. The degrees and coefficients of these polynomials indicate how difficult it is to find the respective solutions of the packing problem. We have calculated some new minimal polynomials of circle packing problems.