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Petrache. *Unconstrained Polarization (Chebyshev) Problems: Basic Properties and Asymptotics.*

We introduce and study the unconstrained polarization (or Chebyshev) problem that requires to find an N -point configuration that maximizes the minimum value of its potential over a set A in p -dimensional Euclidean space. This problem is compared to the constrained problem in which the points are required to belong to the set A . We find that for Riesz kernels $1/|x-y|^s$ the optimum unconstrained configurations concentrate close to the set A and based on this fundamental fact we recover the same asymptotic value of the polarization as for the more classical constrained problem on a class of d -rectifiable sets. We also investigate the new unconstrained problem in special cases such as for spheres and balls and discuss several open problems. (Received September 16, 2019)