Stochastic global optimization: promises and limitations

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Basic principles, potential and boundaries of applicability of stochastic global optimization techniques will be discussed. It will be argued that despite huge potential of stochastic methods there are also clear boundaries on the classes of problems where these methods provide reliable answers. A significant part of the talk will be concentrated on high-dimensional global optimization problems and the so-called curse of dimensionality. We will discuss the geometry of high-dimensional balls and cubes, very slow convergence of global random search algorithms in large-dimensional problems and poor uniformity of the so-called uniformly distributed sequences of points. Different statistical and probabilistic techniques will be considered that could be used for accelerating convergence of global random search algorithms and increasing their reliability.