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The  $L_0$  regularized problem in compressed sensing reconstruction is nonconvex with NP-hard computational complexity. A relaxation of the problem can be expressed as a constrained minimization problem with a non-convex regularizing objective function depending on a parameter and a least squares data fit constraint. In this paper, we propose an efficient method for the reconstruction of sparse signals from undersampled data by developing a Quantized Minimum Energy Particle Swarm Optimization algorithm (QPSO). We are applying our algorithm for the standard phantom image recovery example as well as for models of system identification of chaotic systems. (Received September 25, 2018)