"New Bounds for Restricted Isometry Constants".

We show that if the restricted isometry constant $\delta_k$ of the compressed sensing matrix satisfies $\delta_k < 0.307$ then $k$-sparse signals are guaranteed to be recovered exactly via $l_1$ minimization when no noise is present and $k$-sparse signals can be estimated stably in the noisy case. It is also shown that the bound cannot be substantively improved. An explicit example is constructed in which

$$\delta_k = \frac{(k-1)}{(2k-1)} < 0.5,$$

but it is impossible to recover certain $k$-sparse signals. Some basic properties of the restricted isometry constant are also discussed.