# Two regularization models for computed tomography image reconstruction from limited projection data

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**Abstract**

Computed tomography (CT) has been widely applied in medical imaging and industry for over decades. CT reconstruction from limited projection data is of particular importance. The total variation or $l_1$-norm regularization has been widely used for image reconstruction in computed tomography (CT). Images in computed tomography (CT) are mostly piece-wise constant so the gradient images are considered as sparse images. The $l_0$-norm of the gradients of an image provides a measurement of the sparsity of gradients of the image. However, the $l_0$-norm regularization problem is NP hard. In this talk, we present two new models for CT image reconstruction from limited-angle projections. In one model we propose the smoothed $l_0$-norm and $l_1$-norm regularization using the nonmonotone alternating direction algorithm. In the other model we propose a combined $l_1$-norm and $l_0$-norm regularization model for better edge preserving.

**Keywords**: computed tomography, smoothed $l_0$-norm, $l_1$-norm regularization, nonmonotone alternating direction algorithm