

Recent advances in filter-based tomographic reconstruction methods

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Various advanced tomographic reconstruction methods are available to improve reconstruction quality in the case of incomplete or noisy projection data. Most of these methods, however, are computationally expensive and difficult to implement, and are therefore not used routinely at experimental facilities. Filtered backprojection, on the other hand, is fast, easy to implement, and very popular, but its reconstruction quality degrades if the data has low signal-to-noise ratio, or if only a small number of projections are available. We have recently developed a range of new reconstruction methods that improve the quality of filtered backprojection by changing the convolution filter. Different approaches of changing the filter can be used, each with their own advantages and disadvantages. The reconstruction quality of these new methods are often on par with slower, more advanced reconstruction methods, but because the methods are based on filtered backprojection, existing efficient implementations can be used at experimental facilities to implement them with minimal effort.