Boundary conditions and fast deblurring methods

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Anti-reflective boundary conditions have been introduced recently in connection with fast de-blurring algorithms: in the noise free case, it has been shown that they reduce substantially artifacts called ringing effects with respect to other classical choices (zero Dirichlet, periodic, Neumann) and lead to algorithms costing $O(n^d \log(n))$ arithmetic operations where n^d is the size of the signal if $d = 1$ or of the image if $d = 2$. More precisely, our study considers the role of the noise and how to connect the choice of appropriate boundary conditions with classical regularization schemes. It turns out that a successful approach is close to the Tikhonov technique: we call it re-blurring where the normal equations product $A^T A$ is replaced by A^2 with A being the blurring operator. A wide numerical experimentation confirms the effectiveness of the proposed idea.