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Convergence rates in regularization when the solutions are nonsmooth with respect to forward operators.

We consider the method of approximate source conditions for obtaining convergence rates of regularized solutions to linear and nonlinear inverse and ill-posed problems with forward operators mapping between Hilbert or Banach spaces. For linear problems our focus is on general regularization schemes, whereas the focus is on Tikhonov regularization with convex but not necessarily smooth stabilizing functionals in the nonlinear case. Moreover, we outline the chances and limitations of the method in a nonlinear approach depending on structural conditions expressing the local character of nonlinearity in a neighbourhood of the true solution. Link conditions between the smoothness of the true solution and the smoothing properties of the forward operator are studied, where smoothness is considered in a very general sense. (Received August 07, 2008)