

**A COMPARATIVE STUDY IN OPTICAL TOMOGRAPHY WITH  
REGULARIZATION TOOLS**

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**ABSTRACT.** A comparative study is done in optical tomography with the parametrization of the optical parameters, the gradient filtering and the Tikhonov penalization techniques. The comparison shows that continuous approximation of the parameters is more appropriate as this allows a connection among the whole computational nodes which improves the reconstruction. A dual mesh approach with a finer mesh for the state space and a coarse mesh for the optical properties reduces the ill-posed behavior by reducing the number of degrees of freedom of the inverse problem. Compared to the Tikhonov approach, gradient filtering gives more smooth and regular solutions but an additional equation is to be solved during each iteration step. The results show that the Tikhonov approach reduces the oscillations of the estimated distributions but the choice of the optimal Tikhonov parameter remains difficult and highly time consuming particularly in large scale non linear inverse problems.