Preface

During the Editorial Board Meeting in Qingdao, China, on June 30, 2015, it was decided to launch a series of special issues on important topics of current interests. Numerical methods and algorithms for medical imaging were identified as such a topic. This special issue collects nine solicited papers from active researchers in the area.

In the paper by Yair Censor, et al., simultaneous and sequential projection methods are developed for the implicit convex feasibility problem, useful in image denoising in medical imaging applications. In the paper by Peijun Chen, et al., the proximal primal-dual fixed point algorithm (PDFP) is extended to solve separable multi-block minimization problems with and without linear constraints, and compared to the alternating direction method of multiplier (ADMM). In the paper by Jae Kyu Choi, et al., an image reconstruction method is presented for computerized tomography (CT) via tight frame and simultaneous sinogram extrapolation, to reconstruct a CT image from the limited knowledge of the sinogram. In the paper by Jing Feng, et al., a direct image reconstruction method is proposed for multi-source quantitative photoacoustic tomography (QPAT), which incorporates spatial impulse response (SIR), acousto-electric impulse response (EIR), and limited-view scanning in a coupled opto-acoustic forward model, and employs an alternating direction approach of multipliers with tensor framelet regularization. In the paper by Rongfang Gong, et al., a coupled complex boundary method (CCBM) is introduced and analyzed for the Tikhonov regularization in solving the bioluminescence tomography (BLT) problem governed by the radiative transfer equationi, and this new method has an important stability property allowing the regularization parameter to be chosen based solely on the consideration of solution accuracy. In the paper by Chen Huang, et al., a contour and region based framework is proposed for image quality assessment, based on the perceptual process in which one first perceives structural information and then details of local regions. In the paper by Jia Li, et al., a robust isotropic wavelet frame regularization based CT reconstruction model is proposed for both global reconstruction and interior tomography, and it can be efficiently solved using the split Bregman algorithm. In the paper by Hyoung Suk Park, et al., the beam hardening-induced streaking and shadow artifacts in CT images are investigated theoretically, and a metal artifact reduction (MAR) method is proposed to effectively reduce the artifacts without changing the background images. In the paper by Zhifeng Wu, et al., the infimal convolution regularization is employed for single photon emission computerized tomography (SPECT) reconstruction to cure the staircasing artifacts of the commonly used TV model, a novel fixed-point proximity algorithm is developed, and the convergence of the algorithm is proved.

We thank the authors for their contributions. All the papers went through the regular review process, and we are grateful to the referees for providing their comments. Special thanks are due to Zhiming Chen (Editor-in-Chief), Jinchao Xu (Managing Editor), and Yonghui Yu (Staff, Editorial Office) for their support in the preparation of this special issue.

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