Abstract
Purpose: A bilateral filter (BF) has the property of de-noising digital images while preserving edges. This paper investigates the impact of selecting the BF variables in order to diminish the deterioration of SNR due to reducing the number of excitations (NEX) per image in magnetic resonance imaging (MRI) technique. The paper studies the behavior of the BF on the axial, sagittal, and coronal MRI orientations acquired by spin echo (SE), turbo spin echo (TSE), and the fluid attenuated inversion recovery (FLAIR) pulse sequences from an open MRI device. Method: a set of MRI head images were acquired at different NEXs. The BF was applied at various values of window sizes, filter domains, and filter ranges. The comparison between the high NEX and the BF low NEX MR images was calculated using the peak signal-to-noise ratio (PSNR), the mean-square error (MSE), and the normalized absolute error (NAE). Results: Numerically, the BF is able to achieve up to 29, 44, and 59% noise suppression from the T2 axial, T1 sagittal, and coronal MR views, respectively. Conclusions: The BF can successfully compensate a part of the SNR decrease due to reduce NEX. The behavior of the BF varies with the type of MR view and the type of pulse sequence. The BF is a successful tool to enhance the appearance of low NEX MR images acquired from open MR devices. This means that BF can contribute in shortening the MRI scan time.

Keywords
Open MRI, Bilateral filter, Low NEX MR views