Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Frequency Domain Sampling Using Biomedical Imaging Physics
GUN HA SEO, MINJI CHUNG, RICHARD KYUNG, Choice Research Group —
In magnetic resonance image analysis using physical and computational method, the process of transformation from frequency domain to image domain requires significant amount time because Inverse Fourier Transformation (IFT) takes every frequency points to determine the final output image. This paper shows the mechanisms and physics of image formation using the selectivity of proper k-space by removing different amounts of high or low frequencies to create the most optimal magnetic resonance image of a human tibial bone. Originally, square unit step function, N/2-N/10:N/2+N/10=1, was used during the Fourier Transformations. And Gaussian filter, y= $\exp(-t^2/40^n)$, where t=h-L/2, h=[0,M], L=2*7*N/40, the size of frequency matrix (M, N) = (365,557) was tested. Also circle equations as a filter, r = $\mathrm{sqrt}((x-M/2)^2+(y-N/2)^2)$, were tested in creating the images of the human tibial bone to find an efficient filter. The best efficiency occurred when the exponent n in the proposed Gaussian filter equation is in between 3 and 8, and therefore, a new algorithm is needed to find the exact number since the number is not only an integer.

Richard Kyung
Choice Research Group

Date submitted: 12 Jan 2015 Electronic form version 1.4