1067-42-1410 **Manos Papadakis*** (mpapadak@math.uh.edu), 651 Phillip G Hoffman Hall, Department of Mathematics, University of Houston, Houston, TX 77204-3008. *Filtering Directional Bias and the Construction of Artifact-free Synthetic Tubular Structures in 3D.* Preliminary report.

Digital filters for 2D or 3D-images are generated as the Fourier transforms of square-integrable $\mathbb{Z}^d$-periodic functions ($d = 2, 3$). These filters are sequences that belong to ℓ^d whose entries are called filter taps, while the $\mathbb{Z}^d$-periodic functions from which the filters are generated are referred to as the *transfer function* of the filter. Transfer functions of filters may tend to produce artifacts in certain directions, depending on the variability of the decay rate of the filter's transfer function. This type of variability, which we call directional bias of the filter, is sometimes desirable, e.g. for filters used for directional representations, but in other occasions it may produce errors in the imaging process. We rigorously study the problem of directional bias and of the associated aliasing errors that occur in image reconstruction due to filtering directional bias. We illustrate our findings by showing the effects of filtering directional bias in the construction of artifact-free synthetic tubular structures in 3D used for validating dendritic arbor centerline detection algorithms applied to 3D-images of neurons. These synthetic data are part of joint work with P.H. Herrera and I.A. Kakadiaris. (Received September 20, 2010)