Wavelet Postprocessing for Weak Evoked Biosignal Detection and Radiation Dose Planning

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Wavelet postprocessing improves the reliability of detecting weak biosignals such as otoacoustic emissions and auditory brainstem response electroencephalograms. These procedures, used for neonatal auditory screening, require signal detection at -20 dB or worse signal to noise ratios, and are currently performed by averaging many repetitions. Our algorithm of cyclic tree wavelet denoising accelerates convergence of this average enough to make universal screening feasible. We also describe a related wavelet denoising algorithm that accelerates the convergence to the limit dose distribution of Monte Carlo radiotherapy simulations. Preliminary work promises enough speedup at equivalent accuracy to allow iterative modeling for dose planning.