

Abstract Submitted  
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**Improved evaluation of magnetic nanoparticle susceptibility in hyperthermia, spectroscopy, and imaging**<sup>1</sup> YONG WU, ZHEN YAO, TIMOTHY ATHERTON, LISA BAUER, MARK GRISWOLD, ROBERT BROWN, Case Western Reserve University — Magnetic nanoparticles are becoming increasingly important for both diagnosis (through applications such as MRI and magnetic particle imaging (MPI), which comes from the nonlinear magnetization of nanoparticles and provides images with both high spatial and temporal resolutions) as well as for therapy (through focal heating). Thus understanding and modeling of the magnetic susceptibility of the nanoparticles is critical. In hyperthermia calculations, a constant chord susceptibility approximation is used to get a lower bound estimate of the power dissipated. In later work, this approximation has been adapted to examine the decay effects due to nanoparticle relaxation under oscillating magnetic fields in the MPI modality. We provide in the present paper both analytical and numerical work to understand where it is, or is not, appropriate to make this approximation. In addition, we provide a more general approach that does not rely on the above approximations, and may provide new insight to manufacture optimal nanoparticles for applications.

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