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(54) **METHOD AND SYSTEM FOR RECONSTRUCTING MAGNETIC PARTICLE DISTRIBUTION MODEL BASED ON TIME-FREQUENCY SPECTRUM ENHANCEMENT**

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(57) **ABSTRACT**

A method and system for reconstructing a magnetic particle distribution model based on time-frequency spectrum enhancement are provided. The method includes: scanning, by a magnetic particle imaging (MPI) device, a scan target to acquire a one-dimensional time-domain signal of the scan target; performing short-time Fourier transform to acquire a time-frequency spectrum; acquiring, by a deep neural network (DNN) fused with a self-attention mechanism, a denoised time-frequency spectrum; acquiring a high-quality magnetic particle time-domain signal; and reconstructing a magnetic particle distribution model. The method learns global and local information in the time-frequency spectrum through the DNN fused with the self-attention mechanism, thereby learning a relationship between different harmonics to distinguish between a particle signal and a noise signal. The method combines the global and local information to complete denoising of the time-frequency spectrum, thereby acquiring the high-quality magnetic particle time-domain signal.

10 Claims, 7 Drawing Sheets

Scan, by a magnetic particle imaging (MPI) device, a scan target to acquire a one-dimensional time-domain signal of the scan target — S100

Perform short-time Fourier transform on the one-dimensional time-domain signal of the scan target to acquire a two-dimensional time-frequency spectrum — S200

Acquire, by a trained deep neural network (DNN) fused with a self-attention mechanism, a high-quality magnetic particle time-domain signal based on the two-dimensional time-frequency spectrum — S300

Perform model reconstruction based on the high-quality magnetic particle time-domain signal to acquire a high-precision model — S400