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(G*) A Low-Field Magnetic Resonance Device Using Ceramic Magnets

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Low-field portable magnetic resonance has several advantages over conventional high-field scanners, in that they are low cost, simple to construct, and readily employed outside a dedicated research lab. Numerous magnet designs have been created in recent decades which have been used for material characterization to improve industrial processes, and medical procedures. Portable magnet designs typically employ Neodymium Iron Boron to achieve a high magnetic field. This may be advantageous to increase the magnetic resonance signal but adds to complexity due to the hazards associated with construction and usage.

This presentation will discuss a new magnet design which uses two thin rectangular grade C8 ceramic magnets to create either a large homogeneous measurement volume, or a constant magnetic field gradient of 15 gauss/cm in the measurement volume. Ceramic magnets are inexpensive and may easily be purchased with specific dimensions, making them ideal for magnet design. Additionally, they are naturally corrosion-resistant, making them advantageous for applications outdoors.

The magnets are displaced by a distance to create a 1.8 MHz for 1H (423 gauss) magnetic field over a large volume. Due to the low magnetic field gradient, the corresponding sensitive volume is large, which results in sufficient signal-to-noise to perform a flow velocity profile measurement. As such, we characterize the flow behavior index n'and the average velocity of water flowing in a tube. Such measurements validate this design' s use for magnetic resonance and lay a foundation for further exploration.

Keyword-1

Magnetic Resonance

Keyword-2

Portable Low-Field

Keyword-3

Flow

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