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Analysis of ringing due to magnetic core materials used in pulsed nuclear magnetic resonance applications NEELAM PRABHU GAUNKAR, CAJETAN NLEBEDIM, RAVI HADIMANI, Iowa State Univ, IRFAN BULU, YI-QIAO SONG, Schlumberger-Doll Research Division, MANI MINA, DAVID JILES, Iowa State Univ — Oil-field well logging instruments employ pulsed nuclear magnetic resonance (NMR) techniques and use inductive sensors to detect and evaluate the presence of particular fluids in geological formations. Acting as both signal transmitters and receivers most inductive sensors employ magnetic cores to enhance the quality and amplitude of signals recorded during field measurements. It is observed that the magnetic core also responds to the applied input signal thereby generating a signal ('ringing') that interferes with the measurement of the signals from the target formations. This causes significant noise and receiver dead time and it is beneficial to eliminate/suppress the signals received from the magnetic core. In this work a detailed analysis of the magnetic core response and in particular loading of the sensor due to the presence of the magnetic core is presented. Pulsed NMR measurements over a frequency band of 100 kHz to 1MHz are used to determine the amplitude and linewidth of the signals acquired from different magnetic core materials. A lower signal amplitude and a higher linewidth are vital since these would correspond to minimal contributions from the magnetic core to the inductive sensor response and thus leading to minimized receiver dead time.

Neelam Prabhu Gaunkar
Iowa State Univ

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