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Shock Wave Compression of $Nd_2Fe_{14}B$ Hard Ferromagnets: The Pressure-Induced Magnetic Phase Transition SERGEY SHKURATOV, JASON BAIRD, Loki Incorporated, LARRY ALTGILBERS, US Army SMDC, ALLEN STULTS, US Army RDEC, EVGUENI TALANTSEV, Confederation School, LINC, HENRIK TEMKIN, Dept of Elec Engr, Texas Tech U, YAROSLAV TKACH, Gomez Incorporated — Recently, we developed a series of autonomous pulsed power sources that utilize the electromagnetic energy stored in hard ferri- and ferromagnetic materials. We present the results of experimental investigations of the demagnetization of $Nd_2Fe_{14}B$ high-energy hard ferromagnets by explosive shock waves traveling across and along the magnetization vector $\boldsymbol{M}$. We show that shock wave compression of $Nd_2Fe_{14}B$ ferromagnets causes a phase transition in the ferromagnetic material that results in almost complete demagnetization of the samples. Due to this phase transition the magnetostatic energy stored in $Nd_2Fe_{14}B$ ferromagnets is released within a short time interval and can be transformed into pulsed power. Detailed experimental results are presented for both longitudinal and transverse shock wave demagnetization of $Nd_2Fe_{14}B$ hard ferromagnets of different shapes and sizes.

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