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Ross, M.M.B., Wilbur, G.W., Cano Barrita, P.F.J., Balcom, B.J. (2021), A Portable, Submersible, MR Sensor – The Proteus Magnet, Journal of Magnetic Resonance, <https://doi.org/10.1016/j.jmr.2021.106964>

Ross, M.M.B., Balcom, B.J. (2020), Magnetic Resonance Probe and Method, Reg. No. 52,409

Proteus Magnets for Fluid Composition and Fluid Flow Measurements

UNIVERSITY OF NEW BRUNSWICK
THESIS DEFENCE AND EXAMINATION
in Partial Fulfillment
of the Requirement for the Degree of
Master of Science

by

Michael M. B. Ross

in the Department of Physics

U.N.B., Fredericton, N.B.

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2:00 p.m.**

via MS TEAMS

Examining Committee

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Abstract

In this thesis, the design, fabrication, and testing of a new portable magnet, generically termed the Proteus magnet, is presented as means of performing a broad range of magnetic resonance measurements. The Proteus magnet is intended for ^1H measurements of liquids and is fully functional when submersed in the sample of interest. The Proteus magnet is fabricated from a pair of low-cost, commercial, NdFeB disk magnets, axially polarized, with their North and South poles aligned. The sensor is evaluated through a series of measurements including bulk Carr-Purcell-Meiboom-Gill (CPMG), T_2 , saturation recovery T_1 , self-diffusion, $T_1 - T_2$, and $D - T_2$. The Proteus magnet was modified to permit measurement of average fluid velocity in pipe flow.