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Magnetic Field between a Pair of Solenoid: Experiments vs. Theory[1] PHILIPPE JONES, KATHRIN SPENDIER, AUSTIN ROUTT, WILL THOMPSON, Univ Colorado - Colorado Springs — These experiments compare experimental and theoretical values of the strength of an oscillating magnetic field (B-field) on axis in between two solenoids. The solenoids are made of 24 gauge copper wire, contain different numbers of layers of wire each containing 98 winds that are placed at different (d) apart. The radius of the first layer is 8.55mm. These experiments are important for designing a pair of solenoids that can produce an oscillating magnetic field strong enough for application of magnetic nanoparticle rotation in a highly viscous fluid. A 1-D model was made by using the Biot-Savart Law. The number of layers of wire and winds per layer were taken into account along with the radius of each loop. Measurements of the B-field were taken at d/2 for 1, 5, 9, and 12 layers of 98 winds per layer. The distance between coils was changed from 10mm to 90mm. The measured B-field ranged from 2.005mT to 25.740.05mT depending on the number of layers and distance apart. The results show that experimental B-field values are lower by factors of 1.1 to 1.6 compared to the model for increasing distances. The observed difference is likely due to the limited control and precision of the coil winder used to wind the coils.

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