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Left-handed materials: detailed experimental parametric studies of the fishnet structure V.D. LAM, J.B. KIM, J.W. PARK, N.T. TUNG, S.J. LEE, Y.P. LEE, q-Psi and BK21 Program Division of Advanced Research and Education in Physics, Hanyang University, Seoul, Korea — Recently, a new area of research, called left-handed materials (LHMs), has attracted considerable interests due to their unusual physical properties and novel applications. The first experimental evidence for the existence of LH behavior was proposed by Smith *et al.*, using the split-ring resonator combined with the continuous wire. Several different designs, utilizing this idea for the LHM, have been reported. Zhou *et al.* investigated the LHM based on the H-shaped wires, which exhibits a negative refraction index in the microwave range. Dolling *et al.* introduced a modification with rectangular structures (the so-called fishnet structure) and demonstrated the LH characteristics at a wavelength of 780 nm while S. Zhang *et al.* employed an array of elliptical apertures, showing the LH behavior in the near-infrared regime. The main purpose of these modified structures is to find out the optimized structure that can be easily fabricated and experimentally characterized, especially, LHM working at optical frequencies. In this report, we present the experimental results of the parametric study on the fishnet structure, which are also compared with the previous theoretical studies. These structures were designed, fabricated, and measured in the microwave frequency regime.

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