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A Magneto-Electric Microwave Filter A.S. TATARENKO, G. SRINIVASAN, Oakland University, M.I. BICHURIN, Novgorod State University, Russia — A new class of electric field-tunable ferrite-ferroelectric microwave band-pass filter is discussed. The electric field tunability is possible through magnetoelectric (ME) interactions. The mechanical deformation due to piezoelectric effect in an electric field manifests as a magnetic field shift in the ferromagnetic resonance (FMR) for the ferrite. The filter was fabricated with an ME resonator consisting of bilayers of 30-110 micron thick (111) yttrium iron garnet (YIG) films and lead zirconate titanate (PZT). The bilayer was positioned between input and output antenna in a microstripline structure. The device insertion loss was measured as a function of frequency f, bias magnetic field H (applied parallel to bilayer plane) and the electrical field E applied across PZT. The minimum insertion loss was 4-5 dB at 5-10 GHz. The off-resonance losses were about 20 dB. The E-field tunability was 120 MHz for E = 3 kV/cm for bilayers with 110 micron thick YIG. The ME microwave filters discussed here are miniature in size, would facilitate high-speed operation, and are compatibility with integrated circuit technology. – The work was supported by grants from ARO, ONR and NSF.

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