

Abstract Submitted
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Magnetolectric gyrator DWIGHT VIEHLAND, JUNYI ZHAI, JIEFANG LI, Virginia Tech, M.I. BICHURIN, Novgorod State University, Russia, VIRGINIA TECH TEAM, NOVGOROD STATE UNIVERSITY TEAM — As well-known [1], an ideal gyrator would be an unusual device with respect to other network elements. It would have the unique properties of (i) anti-reciprocity, and (ii) being capable of acting like an impedance inverter. Here, for the first time, we report the design and study of such an ideal gyrator. Our ideal gyrator consists of a trilayer composite of Terfenol-D/PZT/Terfenol-D operated in a L-L mode at its electromechanical resonance ($f \approx 80\text{kHz}$). Measurements have shown that magneto-electric (ME) susceptibility of our composite is comparable with its permeability and permittivity, and that the gyration coefficient achieves a value 0.9. In addition, we have observed a 180° phase-shift between an input current and an output voltage, or vice versa, and proved that our ME laminate behaves as an impedance inverter. We believe that our gyrator may enable resolutions to numerous important and complex network problems. [1] B.D.H. Tellegen, Phillips Research Reports 3, 81 (1948). The work was supported by grants from the Office of Naval Research.

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