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Infrared Hall effect in $SrRuO_3$ and $CaRuO_3$ M.-H. YANG, G. ACBAS, A. MARKELZ, J. CERNE[1], Physics Dept., Univ. at Buffalo, Buffalo, NY, I. OHKUBO, Dept. of Applied Chemistry, Univ. of Tokyo, Tokyo, Japan, P. KHALIFAH, Chemistry Dept., Univ. of Massachusetts, Amherst, MA, H. CHRISTEN, D. MANDRUS[2], Condensed Matter Sciences Div., Oak Ridge National Lab., Oak Ridge, TN, Z. FANG, Inst. of Physics, Chinese Academy of Science, Beijing, China — The mid-infrared (MIR: 115-366 meV) Hall effect is studied in $SrRuO_3$ and $CaRuO_3$ films. In $SrRuO_3$, below 200 meV the MIR Hall response changes sign as a function of temperature near 120 K, similar to the dc Hall effect. Above 200 meV, no sign change occurs and the temperature dependence of the MIR Hall response is similar to the dc magnetization. On the other hand, in $CaRuO_3$, the MIR Hall effect is nearly independent of frequency above 100 meV, has a similar temperature dependence as the dc magnetic susceptibility, and does not change sign, unlike the dc Hall effect. In $SrRuO_3$, the complex Faraday and Kerr angles measured in the MIR at 10 K are in good qualitative and quantitative agreement with first-principles band calculations [Z. Fang et al., Science 2003].

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