Resonant Ultrasound studies of spin- and orbital ordering transitions in RVO$_3$\textsuperscript{1} M. KOEHLER, Dept. Materials Science and Engineering, The University of Tennessee, J.-Q. YAN, Dept. Materials Science and Engineering, The University of Tennessee and Materials Science and Technology Division, Oak Ridge National Laboratory, Y. REN, X-ray Science Division, Argonne National Laboratory, B.C. SALES, Materials Science and Technology Division, Oak Ridge National Laboratory, D. MANDRUS, Dept. Materials Science and Engineering, The University of Tennessee and Materials Science and Technology Division, Oak Ridge National Laboratory, V. KEPPENS, Dept. Materials Science and Engineering, The University of Tennessee — RVO$_3$ perovskites (R = rare earth) have been shown to undergo multiple spin and orbital transitions due to the Jahn-Teller active V$^{3+}$ electrons. We have initiated a study of the elastic response of RVO$_3$, (R = Dy, Gd, Ce) as well as Y$_{1-x}$La$_x$VO$_3$ ($x = 0.05, 0.3, 1$) using resonant ultrasound spectroscopy. The temperature-dependence of the elastic response is dominated by the ordering transitions, with transition temperatures that change with the size of the rare earth. For CeVO$_3$ and LaVO$_3$, two transitions are observed, separated by 17K and 2K, respectively. DyVO$_3$ and Y$_{0.95}$La$_{0.05}$VO$_3$ show three transitions below 220K while GdVO$_3$ only shows one. The full elastic tensor of Y$_{0.7}$La$_{0.3}$VO$_3$ has also been determined from 300K to 50K, yielding the temperature dependence of the 9 orthorhombic elastic moduli.

\textsuperscript{1}Work at ORNL was supported by the U.S. Department of Energy, Basic Energy Sciences, Materials Sciences and Engineering Division.

Veerle Keppens
Dept. Materials Science and Engineering, The University of Tennessee

Date submitted: 09 Nov 2012

Electronic form version 1.4