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**Correlation of spin-wave mode structure and shape imperfections in individual Ni80Fe20 nanomagnets via heterodyne magneto-optic microwave microscopy** HANS NEMBACH, JILA, Dept. of Physics, University of Colorado, Boulder, CO 80309, JUSTIN SHAW, CARL BOONE, Electromagnetics Division, National Institute of Standards and Technology, Boulder, CO 80305, ROBERT MCMICHAEL, Center for Nanoscale Science and Technology, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, TOM SILVA, Electromagnetics Division, National Institute of Standards and Technology, Boulder, CO 80305 — It was recently shown that modes localized at the edges are sensitive to presumed defects. We measured localized spin-wave modes of individual Ni80Fe20 nanomagnets (NMs) with sizes ranging from 100 nm to 400 nm via heterodyne magneto-optical microwave microscopy. Comparison of field-swept spectra with micromagnetic simulations allows for identification of the observed spin-wave modes. One of the modes, the "center-mode", extends throughout the NM. The lowest order (highest resonance field) "end-modes" are localized at the ends of the nanomagnet. As such, it is expected that the end modes are more susceptible to edge defects. Spectra from nominally identical nanomagnets show that the resonance fields of the two end-modes vary substantially between nanomagnets.. We measured the lateral shape of the NMs with scanning electron microscopy, and then used the measured shapes to simulate the mode-spectra, but shape distortions cannot explain the observed mode distortions. Sidewall angle, re-deposition, and mill-induced edge-damage might also be important to accurately model end-mode distortions.

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