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High-frequency modes of a magnetic antivortex[1] MARTIN ASMAT-UCEDA, GRANT RILEY, ARABINDA HALDAR, KRISTEN BUCHANAN, Colorado State University — Magnetic vortices have attracted considerable attention in recent years not only because of their interesting physical properties but also due to their potential for applications. The magnetic antivortex (AV), the topological counterpart of the magnetic vortex, possesses similarly rich dynamics and its spin configuration may prove advantageous for spin-wave-based devices, however, it has not been studied as intensely. Recent experiments show that AV's will form naturally at the intersections of patterned pound-key-like nanostructures that are magnetically soft. Here we present micromagnetic simulations of the dynamics of AV's in these structures. The simulations show that pound-key-like structures made of 30-nm thick Permalloy exhibit a complex dynamic profile that includes a number of discrete high-frequency modes (>1 GHz). Spatial maps of the dynamic modes that were constructed using Fourier analysis of the simulation results show modes that are in similar in character to the radial and azimuthal modes observed for magnetic vortices but the spin dynamics also differ from those of a vortex due to the presence of the elongated nanowires in the pound-key-like structure. The frequencies of the observed modes tend to decrease with increasing sample size, however, the general features of the modes remains relatively unaffected by the structure size. The simulations will be compared to Brillouin Light Scattering (BLS) experimental results.

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