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The effect of interfacial DMI on the amplitudes of dynamic modes in patterned structures[1] BRAYDEN JOHNSON, CHRISTOPHER ARD, KRISTEN BUCHANAN, Colorado State University — Recent work has shown that Dzyaloshinskii Moriya interactions (DMIs) can have a significant effect on spin wave dynamics in extended thin films. Since the effects of DMIs on dynamics are most pronounced for spin waves with short wavelengths, they should be an important consideration for patterned magnetic structures with nanoscale dimensions. Here, we have studied the effect of DMI on the time evolution of the first three dynamic modes in nanoscale circular disks using micromagnetic simulations. We performed cell-by-cell Fourier transforms on the simulation output files to extract resonant frequencies and build mode profiles. The constructed mode profiles show spatial differences with increasing DMIs. In the absence of DMI, the mode is a standing spin wave excitation with a maximum amplitude approximately midway between the vortex core and the disk edge, whereas when DMIs are included, the modes propagate out from the center for a counterclockwise vortex, and involve a larger amplitude near the core and at the edges of the disk. For the higher order modes, the amplitudes of these modes generally increase with increasing DMIs. Modes with even quantization are excited when the DMIs are present. These results show that DMIs can lead to unusual effects in confined geometries.

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