Magnetization dynamic of exchange bias IrMn/NiFe bilayers system were investigated. Samples with fixed ferromagnetic (FM) layers thickness of 25nm and antiferromagnetic (AFM) layer thickness $t_{AFM}$ of 5, 10, 15 and 20 nm were deposited by dc-magnetron sputtering on buffered silicon substrates. The static exchange bias field extracted from the magnetization curves increased at the beginning with increasing AFM layer thickness then slightly decreased. The dynamic behavior was studied from the ferromagnetic resonance (FMR) spectra of the samples under external magnetic field in the range 50-750Oe. The linewidth versus frequency was found to have two distinct slope regions for the samples with high exchange bias values. The damping coefficient is explained in terms of the intrinsic linewidth broadening and is found to mimic the behavior of the exchange bias field with respect to the thickness of the AFM layer.

**Figure 1.** Hysteresis loops along the directions of both the easy and hard axes for $t_{AFM} = 5$nm (a), 10nm (b), 15nm (c) and 20nm (d).

The damping coefficient extracted from $\Delta H$ is presented in Figure 5, where the damping can be separated into two parts. The first part ($\alpha_{int}$) is calculated from the fitting of the first regions in Figure 4(a), which occurred for the frequency up to about 7GHz, and can be explained by the intrinsic contributions. The second part ($\alpha_{ext}$) is calculated from the fitting of the second regions in Figure 4(a), for frequencies above 7GHz, and can be explained by the extrinsic contributions. By comparing Figures 2 and 5, we find that the intrinsic damping follows the behavior of the exchange bias field as a function of the AFM layer thickness. The extrinsic damping departed from the exchange bias behavior at large AFM layer thickness.

**Figure 2.** Exchange bias field versus the AFM thickness.