Probing of nanoscale magnetic properties using advanced magnetic force microscopy

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Magnetic materials have been of great interest due to their multiple applications including magnetic storages and power inductors. The performance of these applications is strongly underpinned by the magnetic properties including magnetic domains and the eddy current loss which originates from periodic change in the magnetic field. In particular, nanoscale magnetic features become more important due to the downsized devices. However, probing of nanoscale magnetic properties beyond magnetic domains has been relatively less explored compared to its significance on the applications. Here, we summarize our recent effort to develop a new approach for probing various magnetic properties associated with eddy current and magnetic domains in magnetic devices using advanced magnetic force microscopy at the nanoscale. The obtained results by the proposed approach show spatially varied nanoscale information on the magnetic properties such as magnetic domains and eddy current. This approach allows exploring simultaneous measurements of various magnetic properties at the nanoscale and can be further extended to the analysis of local physical features.