

C07

Central field design methods for hybrid insertion devices

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The design of the first ten insertion devices built and tested by STI for the Advanced Photon Source (APS) have used initial Halbach scoping followed by 2D and 3D finite element analysis (FEA). We will review our design methods, which ensure the fabricated devices achieve the requested on-axis field strength, minimize pole saturation and demagnetizing fields, and reduce harmonic content, transverse roll off and flux leakages to desired levels. Recent measurements and analyses have indicated the need for additional assessment of the effects of excessively strong magnets, magnet inhomogeneity, transverse pole saturation, part placement sensitivity, and refinements in the material databases used by the FEA codes. Modelling will be compared against measurements at several gaps for Undulator A devices with periods of 33 mm and 27 mm and Wiggler A with an 85-mm period. We note that close agreement has been found between the two different FEA codes used by STI and APS.