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## Symplectic modeling of the ALS-U bending dipoles using 3D magnetic field data

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The Advanced Light Source Upgrade (ALS-U) is a 2 GeV high-brightness, nine-bend achromat storage ring, designed to reduce the natural emittance relative to the existing ALS by a factor of 20 for improved x-ray coherent flux and brightness. The upgrade includes the installation of an accumulator ring of the same energy as, and slightly smaller circumference than, the storage ring. The bending dipoles provide special challenges for accurate symplectic modeling, such as the combination of large sagitta and magnet narrow vertical aperture (in the accumulator ring) and overlapping fringe fields (in the main ring). We describe a procedure for the calculation of symplectic maps for the ALS-U dipoles using robust surface-fitting methods based on 3D finite-element field data, including a discussion of vector potential gauge choice and model-dependent effects on the lattice chromaticity.

### Footnotes

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