

# Isogeometric de Rham complex discretization in solid toroidal domains

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We present an IGA discretization of the continuous de Rham complex by means of adequate spline spaces which assemble in a discrete complex sustaining the same cohomological structure, when the underlying physical domain is a toroidal solid. Discretizations preserving such homological invariant of the physical model are commonly exploited in electromagnetics to obtain numerical solutions satisfying important conservation laws at the discrete level. Thereby one avoids spurious behaviors and, on the contrary, improves accuracy and stability.

The toroidal geometries are of particular interest, for example, in the context of magnetically confined plasma simulations. The singularity of the parametrization of such physical domains demands the construction of suitable restricted spline spaces, called polar spline spaces, ensuring an acceptable smoothness to set up the discrete complex.

## References

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