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Some exemples of topological optimisation for accelerators R&D

Within the programme of 3D metal printing supported by in2p3, the studies by topological optimization for the accelerator components have been associated. This innovation of simulation is challenging for R&D accelerator. The design of components of accelerator should always mind the compromise between saving material or avoid manufacturing difficulties and have a good stiffness of the instrument. The topological optimization associated with 3D metal printing project has promising interest.

In terms of structure design, the 3D printing manufacturing change the way of simulation. The goal is to find a good distribution of the material for given boundary condition with single load case or multi load cases. Since several years, many finite element codes have implemented some topology optimization routines, especially the linkage with CAD code.

To perform topology optimization tasks, some simulation codes have been evaluated with some design constraints. Based on minimization of compliance, a test case is performed on a single cell 800MHz niobium prototype. Others test cases are going on based on design experience. The interest and perspectives are discussed.

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