COMPUTING METHODS IN FFAG ACCELERATORS DESIGN

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Abstract

There has recently been a regain of interest of Fixed Field Alternating Gradient (FFAG) accelerators, the use of which use is now envisaged in various domains, from the fast acceleration of muon beams in the Neutrino Factory, to high average intensity medical beams, via proton and other electron driver applications. The capability of computer codes to model the FFAG type of accelerator and to perform precision tracking is a concern, in design stages, from both point of views of optics and of magnet design. The difficulties come mainly from, (i) the reference orbit moving with energy, in relation with the large momentum bite in these machines, (ii) the presence of possibly very strong sources of non-linearities, as fields and kinematical effects, (iii) the necessity of exploring large amplitude motion inherent to the capacity of FFAGs to accelerate very large emittances. These questions, the way they are addressed, and the methods/codes in use nowadays to perform FFAG studies will be reviewed. This will be illustrated with contemporary problems, drawn from the Neutrino Factory, medical application of FFAGs, etc.

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