THE INFLUENCE OF CELL MISALIGNMENTS AND CAVITY PERTURBATIONS ON LARGE ACCELERATING LINAC STRUCTURES INVESTIGATED USING MODE MATCHING AND THE GLOBALISED SCATTERING MATRIX TECHNIQUE

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Abstract

It is necessity to be able to accurately predict the performance of the any proposed baseline accelerator design in which the effects of couplers, trapped modes, Wakefields, realistic machining and alignment errors as well as numerous other important effects have been taken into consideration. Traditionally used numerical schemes (such as Finite element and Finite difference) require vast resources and time, not only that but the inclusion of realistic defects and misalignments into the baseline configuration will prove time consuming as it will potentially require remeshing of the problem. Here we present a mode matching scheme which utilises a globalised scattering matrix approach that allows large scale electromagnetic field calculations to be obtained rapidly and efficiently. The scalar product of all the S matrices used within this paper has been determined analytically and is calculated only once per transition, adding to the efficiency of the calculation. The influence of cell misalignments and cavity perturbations on the main accelerating linacs of XFEL and CLIC are exhibited. The wake-fields in super-structures and segments of entire modules are also presented

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