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Manipulating Transverse Wakefields With an Alternating Gradient Dielectric Structure

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We attempt to combat the quadrupole-mode transverse wakefields inherent in planar-symmetric dielectric structures by periodically rotating the structure 90 degrees about the beam axis so that the beam sees an alternating quadrupole-like field as it progresses through the entire structure. We study this configuration experimentally in a two-period structure where the gap in each transverse dimension can be controlled independently. This allowed us to independently control the wakefields associated with each orientation of the structure. We demonstrate the existence of strong transverse wakefields with an asymmetric gap and the mitigation of the effects of those wakefields with a symmetric structure. We study the effect of the structure on beam emittance as well as a slice-wise analysis of the transverse wakefield effects. We employ particle in cell simulations to better understand the details of the beam-structure interaction.

Working group

WG4 : Novel structure acceleration

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