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EIC crab cavity multipole effects on dynamic aperture

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The Electron Ion Collider is adopting a crabbing scheme of 25 mrad crossing angle. The local crab cavity system designed to kick the bunches in the first interaction region (IR) also introduces higher order multipoles components in electric field which affect the dynamic aperture. We have studied the strength of each multipole up to $n = 4$, or octupole, with respect to the main dipole field in different operating scenarios. Dynamic aperture study has continued with a fundamental crabbing system at 197 MHz and its second harmonic system at 394 MHz. A comparison of multipole effect for different phase advance between the two crab cavity systems across the IP is shown in this paper. Method of decreasing the sextupole component is investigated as a result of the dynamic aperture requirement.

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Footnotes

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Yes

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