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## Basic high-power design of a 1.5-GHz TM020-type harmonic cavity for the KEK future light source

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In ultralow-emittance synchrotron light sources, harmonic RF cavities are very useful to lengthen the beam bunches by which the adverse effects due to intrabeam scattering can be mitigated. We are developing a 1.5-GHz TM020-type normal-conducting harmonic cavity which is to be used for the KEK future light source project. The harmonic cavity using the TM020 resonant mode has distinct advantages such as: 1) small RF-voltage fluctuation under the transient beam loading, and 2) sophisticated parasitic-mode damping structure which locates at the node of the accelerating field. In our design, we optimized\* the inner shape of the cavity so that the coupling impedances due to parasitic modes were minimized. To minimize the losses of accelerating field in the parasitic-mode damping structure, we arranged three frequency-tuners symmetrically and devised an optimum loop of an input coupler, by which an axial symmetry of the cavity was almost maintained. Based on these concepts, we conducted a basic design of high-power cavity including thermal-structural analysis, which will be presented in this paper.

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### Footnotes

- T. Yamaguchi et al., IPAC2021, MOPAB343.

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Yes

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