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Study on transverse multi-bunch instability in Elettra 2.0

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One of the main characteristics of the future light sources like Elettra 2.0 is the small vacuum chamber cross section. In fact, the resistive-wall (RW) impedance due to the small vacuum chambers cross section enhances transverse coupled-bunch instabilities. In this study, the effect of the RW in the multi-bunch case is investigated versus chromaticity. The threshold currents in the presence of broad-band and RW impedances are estimated for the Elettra 2.0 storage ring at different values of chromaticity using macroparticle tracking and frequency domain semi-analytical calculations. In particular, it is found that, above a certain chromaticity, the threshold current is determined by the radial head-tail modes. In view of mitigating these instabilities, the effectiveness of the transverse bunch-by-bunch feedback system as well as bunch-lengthening harmonic cavities is also useful.

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Footnotes

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Yes

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