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## Longitudinal microwave Instability in the J-PARC Main Ring

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Longitudinal microwave instability has been observed in the J-PARC Main Ring. The longitudinal microwave instability was observed during the debunching process for the slow extraction. This led to electron cloud formation, which can cause transverse beam instability and beam losses. Longitudinal microwave instability was also observed during the latter part of the acceleration for the fast extraction operation, even though no loss or transverse instability related to the longitudinal microwave instability was observed. To investigate the source of the longitudinal microwave instability, spectral analysis was used on the waveform recorded by a high-speed oscilloscope. The spectral analysis suggests the RF cavity and its structure as a possible source of the longitudinal microwave instability. A beam longitudinal dynamics simulation with measured longitudinal impedance of the RF cavity was performed, and its result is compared with the measurement for various beam intensities. In this paper, we present the result of the simulation and measurement of the longitudinal microwave instabilities for various beam intensities.

### Footnotes

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### Region represented

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