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Optimization of RF phase and beam loading distribution among RF stations in SuperKEKB

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SuperKEKB is the e-/e+ collider which targets the world highest luminosity.
In recent operation, SuperKEKB achieved a new world record $4.71\times10^{34}cm^{-2}s^{-1}$ for luminosity with beam current $1.4A$.
In the future, beam current will be increased further to aim at the design value of $3.6A$ and much higher luminosity.
The RF system consists of 38 cavities (30 klystron stations), which share the huge beam loading brought by high current beam with each other cavities.
For beam stability and power efficiency, it is important to distribute beam loading properly among RF cavities.
It is equivalent to adjust the acceleration phase of each cavity.
However, it is difficult to evaluate acceleration phase using only the pickup signal.
Therefore, we established a method to evaluate the beam loading balance among RF stations from the RF power measurement for each cavity, and to adjust the acceleration phase.
This presentation introduces a method for evaluating and optimizing the beam loading (acceleration phase) among stations in SuperKEKB, which has a large number of RF stations, and its operation.

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