

Low Level RF Workshop 2022



9-13 Oct 2022, Brugg-Windisch, Switzerland



Contribution ID: 59

Type: **Oral**

Testing of a modified Active disturbance Rejection Control (ADRC) algorithm for microphonics rejection in Superconductive Radio Frequency (SRF) cavities

Thursday, October 13, 2022 9:30 AM (20 minutes)

SRF cavities are characterized by low energy losses derived from their extremely high intrinsic quality factor. In accelerators geared towards new applications such as new light source linacs, such cavities are operated with extremely high loaded quality factor due to the negligible beam loading involved. In those particular cases, the bandwidth of RF systems is very narrow, so they become much more sensitive to dynamic detuning caused by mechanical perturbations.

The work presents the test of a modified ADRC algorithm capable of greatly minimizing the peak detuning of cavities operated in those circumstances. The modifications made to the algorithm enables the open loop stability analysis and eases the design and implementation of the controller. The ultimate objective is to test the controller in a 9-cell tesla cavity using the test bench displayed in HoBiCat. For that matter and in order to prevent any undesired obstacle, a HIL system developed by HZB for SRF cavities has been used to test and adjust the parameters of the algorithm. The obtained results are presented here.

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Session Classification: Superconducting RF

Track Classification: Low Level RF Workshop 2022