

Experimental results using a Modified ADRC control algorithm for Microphonics Reduction in SRF cavities

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In this work, the experimental results obtained with a new type of disturbance rejection algorithm control, the Modified ADRC (MADRC) algorithm applied to a 9-cell tesla-type SRF cavity are presented. The cavity is located in the HobiCat test bench of the Helmholtz-Zentrum Berlin. The main advantage of the MADRC controller is the addition of a new control element for increasing the stability range of the closed-loop system, which is designed by loop shaping techniques. The methodology can be applied in the presence of time-delay, in this case introduced by the piezoactuator. Another advantage of the approach is that can be combined with feedforward controllers.

In general, the stochastic nature of microphonics and the relatively large delay of piezoelectric actuators reduce the stability margin of feedback systems and, therefore, the disturbance reduction capability is quite limited. In this work, the experimental results showing the improvement in the disturbance reduction obtained with the new MADRC approach are shown.

Keyword

Microphonics reduction, Modified ADRC

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