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BBU and Corkscrew Growth Predictions for the DARHT Second Axis Accelerator

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The second axis accelerator of the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility will produce a 2-kA, 20-MeV, 2-μs output electron beam with a design goal of less than 1000 π mm-mrad normalized transverse emittance. In order to meet this goal, the beam transport must have excellent optics and both the beam breakup instability (BBU) and transverse "corkscrew" motion (due to chromatic phase advance) must be limited in growth. Using data from recent experimental measurements of the transverse impedances of actual DARHT-II accelerator cells by Briggs *et al.* [1], we have used the LLNL BREAKUP code to predict BBU and corkscrew growth in DARHT-II. The results suggest that BBU growth should be both quite small and, presuming the initial excitation level is of the order 100 microns or smaller, not seriously degrade the final achievable spot size at the x-ray converter. For control of corkscrew growth, a major concern is the number of "tuning" shots needed to utilize effectively the so-called "tuning-V" algorithm. Presuming that the solendoid magnet alignment falls within spec, we believe that possibly as few as 50-100 shots will be necessary to set the dipole corrector magnet currents. We give some specific examples of tune determination for a hypothetical set of alignment errors.

[1] R.J. Briggs, this conference.

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