Investigation of Passive Vibration Damping Methods for the Advanced Photon Source Storage Ring Girders*

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Abstract

Beam stability is a major concern for the operation of the APS. One of the many contributing factors to electron beam instability is mechanical vibration of the accelerator components, especially the focusing magnets. The electron beam should be stable to 5% of its rms size to maintain the specified photon beam stability. The APS utilizes steel girders to support the conventional magnets and vacuum chambers in the storage ring (SR). Three pedestal and jack assemblies support the girders. Damping pads are presently installed between the pedestals and the jacks. It has been shown that these damping pads are very effective in reducing the fundamental girder vibration mode. The horizontal vibration levels of the SR quadrupole magnets are presently within specification at between two and four times the ground motion, i.e., 50-100 nm rms (4-50 Hz). Future improvements to the APS beam quality would require a further reduction in girder vibration. Several options for reducing the vibration of the girders and magnets are discussed, and the measurement results are presented.

Keywords: vibration, beam stability

Presentation: Oral

* Work supported by the U.S. Department of Energy under Contract No. W-31-109-ENG-38.