

The vibration/stabilization studies of this new cantilever support were executed in the framework of ANSYS by Hiroshi Yamaoka, a senior engineer at KEK.

The preliminary results are shown for the two cases of 3.8m and 5.9m long cantilever support systems in the page-3 (yamaoka-QDO-vibration-BDStunnel.pdf).

In this study, the cantilever is the rectangular double tubes as described in the TDR, whose dimension are shown in the page-2.

The geometrical models are shown in the page-4, where the bottom of the girder is assumed to be fixed on the BDS tunnel.

The results of the static and modal analysis are shown in the page-5 and 7 for the 3.8m and 5.9m cantilever systems, respectively.

The results of the dynamic analysis are also shown in the page-6 and 8, respectively, where two input ground motions (GMs) are taken from the underground GM in Fujisawa as a representative of Kitakami IP site and the floor GM in the CMS experimental hall, CERN. In this analysis, the damping ratio is assumed to be 0.5% since it has been verified by experiences at the SuperKEKB.

The numerical results are listed in the page-9. The vibrational stabilities of both cantilever systems are satisfied, i.e. within the integrated amplitude of less than 50nm in the frequency region of greater than 5Hz, while the 5.9m cantilever system has larger sag at the tip a few times than the 3.8m cantilever system.