Study on Beam Behavior in Beam Transport Line for Accelerator Driven System

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Accelerator Driven System (ADS) has the inherent transient that the change of beam behavior affects the core performance. Such beam variation is called “beam transient”, and it was reported that beam transient has a possibility to cause core damage in terms of core analyses [1, 2]. This study is intended to examine the beam behavior in beam transport line.

The beam transport calculation code TRACE 3-D is selected for beam behavior analysis, and the applicability of TRACE 3-D to ADS beam transport line is verified by comparing with the operating data and the calculation result for ADS beam transport line by other code. The operating data of beam centroid position are obtained in J-PARC linac and L3BT beam transport line. TRACE 3-D calculation is performed on the basis of measured data, and the calculation results are agreed well. As for the comparison with other code of MAD for ADS beam transport line, both calculation results show similar tendency.

The beam behavior in ADS beam transport line is analyzed with respect to the presence of various changes such as the deviation at the entry of the transport line and the alignment error of magnets. The calculation results reveal that large movement of the beam centroid position is possible at the surface of the target, and it can lead to the core damage as compared with core analysis results.

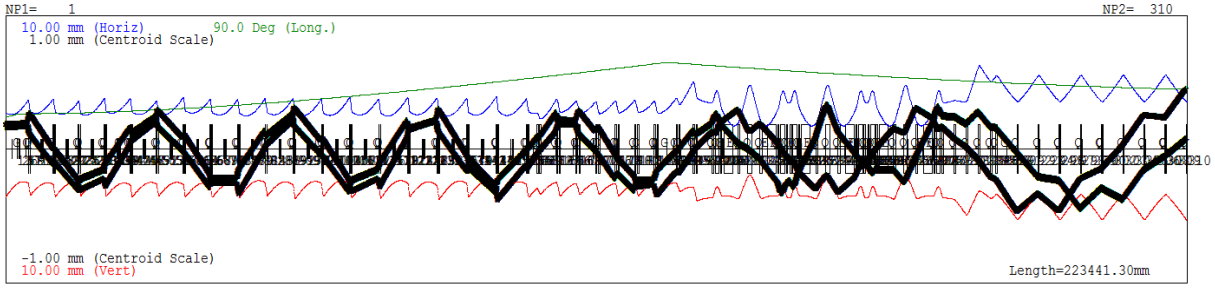

Fig. 1 One example of TRACE 3-D calculation for the verification with measured data of J-PARC

References

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[2] N. Aizawa, F. Kubo and T. Iwasaki, J. Nucl. Sci. Technol., **49,** 9, 888 (2012).