Design of Energy Degrader Controller for High Precision Radiotherapy

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Abstract

Control of radiotherapy systems is as critically important as the instrumentation that delivers it. This project focuses on the design of a digital control card, the Energy Degrader Controller (EDC), for the proton therapy facility at iThemba LABS.

•*Objectives*

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•To investigate a digital control strategy that will deliver high sensitivity, set point tracking, and fast system response, error rejection in real-time. The controller designed should also be robust.

•To discover the hardware platform from customizable digital electronics that will realize the controller.

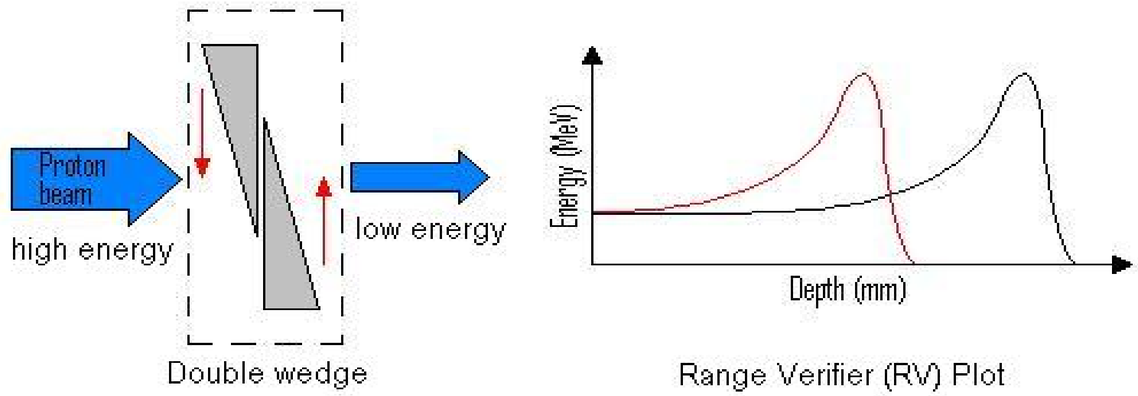
Introduction

Radiotherapy at iThemba LABS involves a number of systems working together, from the acceleration of protons by the cyclotron, to beam transport, and finaly to patient treatment.

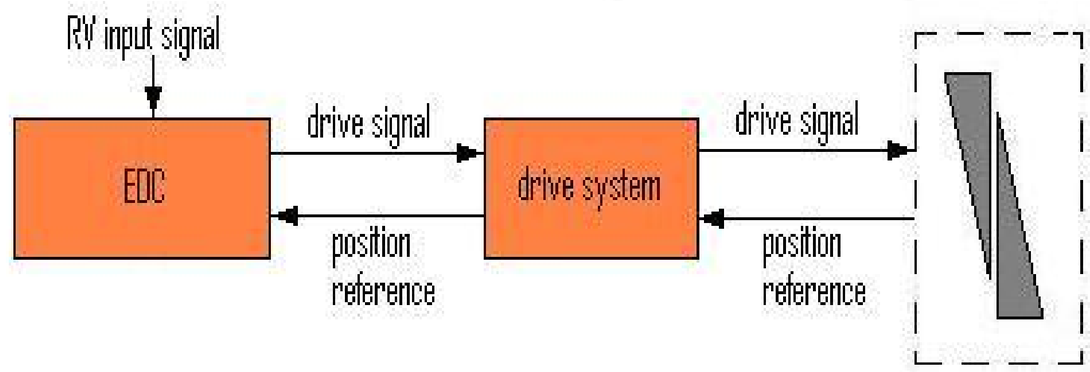
The EDC forms the control of the Energy degrader System. EDC controls the Double wedge system to maintain the required energy of the proton beam that positions the bragg peak at the specified depth, when the beam is prepared for clinical purposes.

References

1) Adaptive Control Systems. M Braae, UCT Press.
2) Automation and control, Inderscience Publishers
3) Conceptual design of proton beam at iThemba LABS, iThemba LABS internal release.



(1) Double wedge altering intensity



(2)How EDC controls the double wedge

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