

Design of a BSA for Producing Epithermal Neutron based on D-T Neutron Source for BNCT

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Particle and Heavy Ions Transport code System (PHITS) is used to simulate capability to produce an epithermal neutron flux for BNCT of various beam shaping assembly (BSA) designs. It is assumed in this work that all designs of BSA considered is a cylindrical geometry. It is found that by adopting the flux of 14.1 MeV neutrons from a D-T neutron generator, the design that yields an optimum output is the BSA design with ^{238}U as multiplier, AlF_3 as moderator, Pb as reflector, Al_2O_3 as fast neutron filter, Li as thermal neutron filter, Ni as gamma shield, and Bi as collimator, in which the output of the proposed BSA at the beam port can satisfy the criteria for boron neutron capture therapy (BNCT) from the International Atomic Energy Agency (IAEA). It is also found that the output of the proposed design is better than the output of other BSA designs, such as those reported by Eskandari and Kashian [1], Rasouli et al. [2] and Rasouli and Masoudi [3]. In addition, no thermal neutron is found at the beam port of the proposed design.

[1] Eskandari M R and Kashian S 2009 *Annals of Nuclear Energy* **36** 1100-1102

[2] Rasouli F S, Masoudi S F and Kasezas Y 2012 *Ann. Nucl. Energy* **39** 18

[3] Rasouli F S and Masoudi S F 2012 *Appl. Rad. Isotopes* **70** 2755

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