عنوان مقاله:

Dose Optimization in a Fuzzy Model of High-Dose Rate Brachytherapy Problem

محل انتشار:

مجله کنترل و بهینه سازی در ریاضیات کاربردی, دوره 8, شماره 2 (سال: 1402)

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نویسندگان:

Mohammad Mohammadi Najafabadi - *Department of Mathematics, Payame Noor University (PNU), P.O. BOX. ۱۹۳۹۵-۳۶۹۷ Tehran, Iran.*

Habibeh Nazif - *Department of Mathematics, Payame Noor University (PNU), P.O. BOX. ۱۹۳۹۵-۳۶۹۷ Tehran, Iran.*

Fahime Soltanian - *Department of Mathematics, Payame Noor University (PNU), P.O. BOX. ۱۹۳۹۵-۳۶۹۷ Tehran, Iran.*

خلاصه مقاله:

This paper is motivated by high dose rate brachytherapy treatment planning problems which involve the specification of the movement schedule of a radiation source so that the target volumes are adequately covered with sufficient doses and organs at risk are not radiated beyond the clinical acceptance threshold. It utilizes four powerful multi-objective evolutionary algorithms (MOEA), which create a set of equally-weighted Pareto optimal solutions instead of only one and produce better results compared to other optimization methods. These algorithms include non-dominated sorting genetic algorithms, Pareto envelope-based selection algorithm, non-dominated ranking genetic algorithm, and strength Pareto evolutionary algorithm. The results indicate that the last algorithm uses the dependency between decision variables to solve them efficiently and is the best type of MOEA both in terms of convergence criteria and solution diversity maintenance for the brachytherapy problems.

کلمات کلیدی:

Multi-objective optimization, Fuzzy logic, Evolutionary algorithms, Brachytherapy