

# Review of “Development of an Evolutionary Filter Optimization Routine (EFOR)”

**Overview:** In this work, the author explored a method for developing a genetic algorithm to optimize a neutron filter. It was shown that previous efforts created a method for designing neutron filters. However, these early efforts were computationally expensive. The optimization routine presented in this work converged on an ideal neutron filter using reasonable computational resources.

The paper seems to be put together really well. The motivation behind the project was stated clearly and the proposed method was explained thoroughly. The proposed revisions to this paper cover grammatical issues and the layout of the paper.

**Acceptance:** Accept

## **Suggested Revisions:**

### 1. **Paragraph:** Introduction

**Sentence:** “Although this approach found an ‘optimum’ filter, a desire to incorporate a larger number of materials and variable slab length, as well as to further reduce run-time led to the implementation of a formal optimization technique, a genetic algorithm (GA) to solve the problem.”

**Suggestion(s):**

1. “Length” should be plural
2. “led to the development of” (or some variant) should be added before “a genetic...”

### 2. **Paragraph:** Theory

**Sentence:** “Repeating this process for several generations, while eliminating the least fit individuals from each generation will eventually cause the population to converge on an optimum solution.”

**Suggestion(s):**

1. Reword sentence. Perhaps remove comma after “generations”?

### 3. **Paragraph:** Description of EFOR

**Sentence:** “The code begins with a driver file that starts the cycle routine on one core and if ran in parallel, sends each other core to wait within the slave script to receive work.”

**Suggestion(s):**

1. Add a comma after “and”.

### 4. **Paragraph:** Description of EFOR

**Sentence:** “The data is then stored by increasing fitness and stored, and the the process is looped until a user-defined number of cycles, or generations, is complete.”

**Suggestion(s):**

1. Reword sentence. I’m not sure what the second use of “stored” is for.

5. **Paragraph:** Description of EFOR

**Sentence:** “Self-contained is a function that creates a number of random chromosomes and creates the current generation of filter objects with those.”

**Suggestion(s):**

1. Reword sentence. I’m not sure what this sentence is saying. Perhaps remove “with those”.

6. **Paragraph:** Description of EFOR

**Sentence:** “Each filter is given a unique ID number which is contained within the MCNP file names and simplifies the process of creation of, data extraction from, and deletion of the MCNP files.”

**Suggestion(s):**

1. Make this sentence into two sentences.

7. **Paragraph:** Description of EFOR

**Sentence:** “The slicing operation employs a technique called uniform crossover, which compares two given parent chromosomes one gene at a time and grants each a 50% change they’ll be passed onto the child.”

**Suggestion(s):**

1. Replace “they’ll” with “they will.”

8. **Paragraph:** Experiments

**Sentence:** “Follow that, an experiment was done to test how well the algorithm scaled on multiple cores.”

**Suggestion(s):**

1. Replace “Follow” with “Following”.

9. **Paragraph:** Experiments

**Sentence:** “Keeping a total number of filters calculated constant, 225, two runs were done, one using an initial population of 25 with 9 generations total, and one with an initial population of 75 with 3 generations total.”

**Suggestion(s):**

1. Replace “a total number of...” with “the total number of..”
2. It would be easier to follow this sentence if it was broken up into 2 or more sentences.

10. **Paragraph:** Experiments

**Sentence:** “Lead and tungsten were chosen for their high Z-numbers, being notoriously good at gamma-ray shielding and thus improving the NG ratio.”

**Suggestion(s):**

1. Reword sentence. Perhaps say “Lead and tungsten, being notoriously good at gamma-ray shielding, were chosen...”

11. **Paragraph:** Results and Discussion

**Sentence:** “At 20 cores, there is a slight drop in speedup observed, which is possibly explained by uneven work distribution.”

**Suggestion(s):**

1. Reword sentence. Perhaps say “A slight drop in speedup is observed at 20 cores. This is possibly explained by....”

12. **Paragraph:** Results and Discussion

**Sentence:** “If the generation size is not divisible by the number of cores used in the run, a portion of the cores will have an extra filter to calculate, so on small scale calculations such as this one, the effect is noticeable.”

**Suggestion(s):**

1. Break sentence up into 2 or more sentences.

13. **Comment:** The text that accompanies the figures is hard to distinguish from that of the body of the paper. Using a different font or indent the figure text might help with this.

14. **Comment:** Adding a conclusion section would help wrap the paper up.