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SPACE DEBRIS SYMPOSIUM (A6)  
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OPTIMIZING OBSERVATION SCHEDULING FOR DEBRIS TRACKING FACILITY WITH  
SHORTEST PATH ALGORITHM**Abstract**

In order to maintain a catalogue with a large number of space debris, it is inevitable to establish a network of debris tracking facilities costing a lot of money. Moreover, there is a significant increase in space debris every year and a massive number of smaller size debris need to be catalogued in the near future. One way to cope with the circumstances of observation time shortage to track an increasing number of space debris is to make larger investigation to build more tracking facilities. Another way is to optimize observation scheduling so that a tracking facility can make more contribution to the cataloguing. In our research, shortest path algorithm was introduced to solve the optimization problem. We established a strategy of forming a brief graph representing observation scheduling process which is the input of our algorithm. We also established an evaluation function which is critical for the optimization considering several factors including the importance degree of debris, orbit accuracy needs, orbit update frequency and facility observation accuracy. To optimize a 24h observation scheduling with the number of space debris over 10000, we had to cope with the needs of large computer memory and long computation time. Some improvements had been made to the traditional shortest path algorithm, so that the extremely complex optimization process can be accomplished within several minutes using ordinary PC with small memory consumption.