

A Trajectory Minimizing the Exposure of a Moving Object

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Abstract—A corridor Y for the motion of an object is given in the space $X = \mathbb{R}^N$ ($N = 2, 3$). A finite number of emitters s_i with fixed convex radiation cones $K(s_i)$ are located outside the corridor. The intensity of radiation $F(y)$, $y > 0$, satisfies the condition $F(y) \geq \lambda F(\lambda y)$ for $y > 0$ and $\lambda > 1$. It is required to find a trajectory minimizing the value

$$J(\mathcal{T}) = \sum_i \int_0^1 F(\|s_i - t(\tau)\|) d\tau$$

in the class of uniform motion trajectories $\mathcal{T} = \{t(\tau) : 0 \leq \tau \leq 1, t(0) = t_*, t(1) = t^*\} \subset Y$, $t_*, t^* \in \partial Y$, $t_* \neq t^*$. We propose methods for the approximate construction of optimal trajectories in the case where the multiplicity of covering the corridor Y with the cones $K(s_i)$ is at most 2.

Keywords: navigation, optimal trajectory, irradiation, moving object.

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