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AND
APPLICATIONS**
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Numerical solution of the some parametric inverse problem of atmospheric optics by Monte Carlo methods

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In the paper parametric inverse problems of atmospheric optics are considered. To solve these problems we applied algorithm "the method of dependent tests for transport theory problems" of Monte Carlo methods. The problems reduced to linear system of equations for parameters and solved by optimization methods. The numerical solution of the optical depth of the extinction specified. The approximation error is no more than 5-10 percent, which is quite satisfactory for Monte Carlo methods.

Estimation of derivatives of I_k by Monte Carlo methods with respect to parameter τ (is optical depth) to estimate this parameter with the method mentioned in the proceeding.

This parameter $\tau(\mathbf{r}_n, \mathbf{r}_k, \lambda) = \int \sigma(\mathbf{r}_n + \omega_k l, \lambda) dl$ is called "the optical depth" where $(\omega_k)l = \left(\frac{\mathbf{r}_k - \mathbf{r}_n}{|\mathbf{r}_k - \mathbf{r}_n|}\right)l$ is called "the optical length from \mathbf{r}_n to \mathbf{r}_k ", ω_k is unit length vector.

Lattices of tringulations of line and their f -vec

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The problem of connections of the structure complexes is discussed. This problem naturally leads to optimization.

Consider a polyhedral cone K , i.e. the set of system of linear inequalities over the field of rational numbers

$$\sum_{j=1}^d a_{ij} x_j \geq 0 \quad (i = 1, \dots, m)$$

The set $K_I = \{x = (x_1, \dots, x_d) \in K : \sum_{i \in I} x_i = 1, i \in \{1, \dots, m\}\}$ is called I -face of K . If $K_I \neq \emptyset$ is called I -face of K . The set of all proper faces is called $\mathcal{F}(K)$ and the set of all faces of K ordered by inclusion is called $\mathcal{L}(K)$ (with maximal face K).

Let $B = (b_{ij})$ be $(d \times n)$ -matrix with coefficients $b_{ij} \in \mathbb{Z}$. Let $\Delta(J) = \Delta(B(J))$, where $J \subseteq \{1, \dots, n\}$.

Denote by $B^{\leq} = \left\{ \sum_{j=1}^n b_{ij} y_j : y_j \geq 0 \right\}$ the set of combinations of its columns and suppose that B^{\leq} is contained in system (1). Analogously, let A_{\leq} be the set of combinations of rows of A . To determine the structure of non-zero elements of matrix $(c_{ij}) = C = AB$. Let $c_{ij} = 0$ and $\gamma_{ij} = 1$ otherwise. We call a matrix B (d, n) -realized if there exist matrices $A \in \mathbb{Z}^{m \times d}$ and $B \in \mathbb{Z}^{d \times n}$ such that $c_{ij} = \gamma_{ij}$. For $k = 0, \dots, d$ we denote by $\Delta_k = \bigcup_{\tau=1}^t \Delta_k(S_{\tau})$ the simplicial complex Δ . Assume that $f_k(\Delta) = |\Delta_k|$ and $f(\lambda, \Delta) = 1 + \sum_{k=1}^d f_k(\Delta) \lambda^k$. Represent $f(\lambda, \Delta) = \sum_{k \in \mathbb{Z}_{\leq d}} \gamma_k(\Delta) \lambda^k (1 + \lambda)^{d-k}$. The integer γ_k is called (d, n) -realized if $\gamma_k = \gamma_k(\Delta)$ for $k = 0, \dots, d$.

The (d, n) -realization of B with knots from B is such that S_{τ} ($\tau = 1, \dots, t$) satisfy the following conditions

- 1) $S_{\tau} \subseteq \{1, \dots, n\}$, 2) $|S_{\tau}| = r = \text{rank } B(S_{\tau})$,



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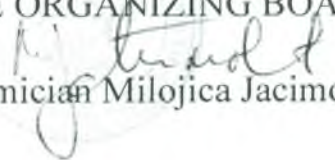
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CERTIFICATE

Kanat Shakenov participated in the Sixth International Conference *Optimization and Applications* (OPTIMA 2015), organized by Montenegrin Academy of Sciences and Arts, University of Montenegro, Dorodnicyn Computing Center of RAS and University of Evora, Portugal. The Conference was held in Petrovac, Montenegro, September 28 – October 3, 2015. The participant delivered the talk: *Numerical solution of the some parametric inverse problem of atmospheric optics by Monte Carlo methods*. The participant paid the conference fee of 120,00 EUR.

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