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NUMERICAL SOLUTION OF RLW EQUATION USING INTEGRATED RADIAL BASIS FUNCTIONS

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Abstract. Please provide an abstract of 50 to 150 words. The abstract should not contain any undefined abbreviations or unspecified references.

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1. Introduction

The problem of the establishment of the scientific results priority is not new (see, for example, in [3] the discussion between Gauss and Legendre concerning authorship of the method of the least squares).

However, the problem of citing, be actual enhanced attention only in the second half of the XX century. At this time such questions as Ethics of citing and other sociological problems (chapter V, 6 [4]) have been widely discussed. It should be noted that , the questions of citing have been considered in detail in the works [1, 2] devoted to the problem of the creation of the world information scientific space.

Point is that Parameters of the citations become more and more popular and are actively applied in various spheres to the estimation of the efficiency of the activity of scientists .

Moreover, [5]: ... chairman of the research policy committee of the universities of the United Kingdom professor E.Thomas emphasizes that, in 2008 numerical estimations of the citations (bibliometric valuation) will be used at the planned financing of the researches. This aspect of application of citations estimations already mentions the bases of planning of financing in a science and education.

In this connection, the problem of objectivity of citing got a special importance.

To it, in particular, testifies resulted in discussion which has taken place in July, 2007 in Internet journal iMechanica, Web of mechanics and mechanicians (http://imechanica.org/) which uses the server of the Harvard School of Engineering and Applied Sciences.

2. Parametrization of stabilizing regulators in a problem with continuous time [3].

Definition 1. [1] A fuzzy set $\widetilde{x}$ is called a fuzzy number if its membership function, denoted by $\mu_{\widetilde{x}} : \mathbb{R} \longrightarrow [0, 1]$, satisfy all following conditions:

(i): $\widetilde{x}$ is a normal fuzzy set, i.e., $\exists a \in \mathbb{R};\ \mu_{\widetilde{x}}(a) = 1$,

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(ii): $\widetilde{x}$ is a convex fuzzy set, i.e., $\forall \beta \in [0,1]$ and $\forall a, b \in \mathbb{R};\ \mu_{\widetilde{x}}(\beta a + (1-\beta)b) \geq \min\{\mu_{\widetilde{x}}(a), \mu_{\widetilde{x}}(b)\}$,

(iii): $\mu_{\widetilde{x}}$ is an upper semi-continuous function, i.e., $\forall a \in \mathbb{R}$; $\{b \in \mathbb{R} : \mu_{\widetilde{x}}(b) < a\}$ is an open subset of $\mathbb{R}$,

(iv): The closure of $\{t \in \mathbb{R} : \mu_{\widetilde{x}}(t) > 0\}$ is a compact subset of $\mathbb{R}$.

We present the parametrization procedure [2] considering the stationary linearquadraticGaussian (LQG) problem (see, for example, [4]). This may be representation in the states-space (state-space equation)

$$\dot{x} = Fx + Mu, y = Lx. \tag{1}$$

Lemma 1. *[1, 2] Let us assume that* $\{[\underline{x}(\alpha), \overline{x}(\alpha)] : \alpha \in [0,1]\}$ *be a set of bounded closed intervals in* $\mathbb{R}$ *and also two following conditions hold*

(a): *if* $\alpha_1, \alpha_2 \in [0,1]$ *and* $\alpha_1 \leq \alpha_2$ *then* $[\underline{x}(\alpha_2), \overline{x}(\alpha_2)] \subseteq [\underline{x}(\alpha_1), \overline{x}(\alpha_1)]$,

(b): *if the non-decreasing sequence* $\{\alpha_i\}_{i=0}^{\infty}$ *converges to* α *on* $[0,1]$, *then* $[\lim_{i\to\infty} \underline{x}(\alpha_i), \lim_{i\to\infty} \overline{x}(\alpha_i)] = [\underline{x}(\alpha), \overline{x}(\alpha)]$,

then the set $\{[\underline{x}(\alpha), \overline{x}(\alpha)] : \alpha \in [0,1]\}$ *constructs the* α*-cuts of* $\widetilde{x} \in \mathbb{F}$.

Moreover, if the closed intervals $[\underline{x}(\alpha), \overline{x}(\alpha)]$, $\alpha \in [0,1]$, *construct the* α*-cuts of an arbitrary fuzzy number, then the above-mentioned conditions* (a) *and* (b) *are satisfied.*

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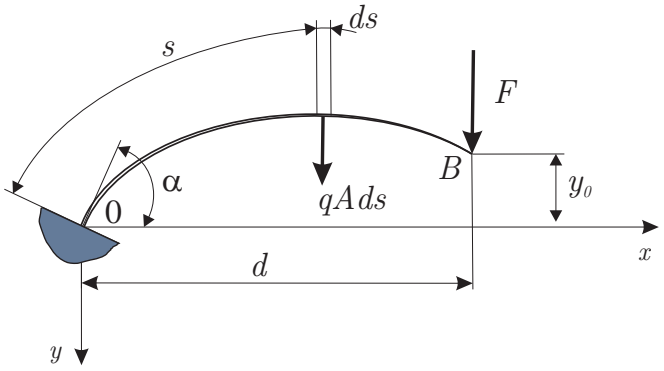


FIGURE 1. SVEIRS compartment model.

Remark 1. [1] Suppose that $\widetilde{x}_1, \widetilde{x}_2, \ldots, \widetilde{x}_n \in \mathbb{F}$, $\lambda_1, \lambda_2, \ldots, \lambda_n \in \mathbb{R}$ and also $\widetilde{u} = \sum\limits_{i=1}^{n} \lambda_i \widetilde{x}_i$. Then

$$u^C(\alpha) = \sum_{i=1}^{n} \lambda_i \, x_i^C(\alpha),$$

$$u^R(\alpha) = \sum_{i=1}^{n} |\lambda_i| \, x_i^R(\alpha).$$

Here and further E - is a unit matrix. For the simplicity argument s will be absent further. So, let the motion of the object be described by the system of ordinary differential equations similarly (1)

Theorem 1. *Let* $\widetilde{\boldsymbol{X}} \in \mathbb{F}^{n\times n}$ *and* $\boldsymbol{A} \in \mathbb{R}^{n\times n}$. *Then*

$$\left(\boldsymbol{A} \cdot \widetilde{\boldsymbol{X}}\right)^C (\alpha) = \boldsymbol{A} \cdot \boldsymbol{X}^C(\alpha), \qquad \left(\widetilde{\boldsymbol{X}} \cdot \boldsymbol{A}\right)^C (\alpha) = \boldsymbol{X}^C(\alpha) \cdot \boldsymbol{A},$$

and

$$\left(\boldsymbol{A}\cdot\widetilde{\boldsymbol{X}}\right)^{R}(\alpha)=|\boldsymbol{A}|\cdot\boldsymbol{X}^{R}(\alpha),\qquad \left(\widetilde{\boldsymbol{X}}\cdot\boldsymbol{A}\right)^{R}(\alpha)=\boldsymbol{X}^{R}(\alpha)\cdot|\boldsymbol{A}|,$$

where $|\boldsymbol{A}|=(|a_{ij}|)_{n\times n}$.

Proof. The proof can be obtained from Theorem 2 easily. □

In [3] the method is suggested for parametrization of the matrix W in the form (relation (1) [3]) This attitude changing could be performed applying only one rotation at the angle χ with respect to the axis, which direction is determined by the angles α, β, γ.

3. Conclusion

The considered examples confirm the thesis [2] that in procedure of citing and its estimations the narrowest and undeveloped moment is maintenance of objectivity of citing and novelty of the obtained results. It is marked, that the problem of objectivity of citing can be not always caused by a language barrier.

4. Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section before the reference list. The names of funding organizations should be written in full.

References should be listed fully in alphabetical order by author's last name. All references must be cited in the paper. The names of the authors should not be used in-text citations The papers not meetings the Journal's requirements will not be considered.

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