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ON SOLUTIONS OF A HOMOGENEOUS LINEAR MATRIX EQUATION WITH VARIABLE COMPONENTS

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1. We denote the totality of real numbers by $\mathbf{R}$ and the totality of complex numbers by $\mathbf{C}$.

Let I be a closed interval $[\alpha, \beta]=\{t \mid \alpha \leqq t \leqq \beta, t \in \mathbf{R}\}$. We denote by $C^{\mu}(I, \mathbf{R})$ the totality of real-valued functions defined and of class C^{μ} on I $(\mu=0, 1, \cdots, \infty)$, and hereafter we fix some μ.

A complex-valued function $f(t)$ defined on I is called a function of class C^{μ} on I if $\operatorname{Re} f(t) \in C^{\mu}(I, \mathbf{R})$ and $\operatorname{Im} f(t) \in C^{\mu}(I, \mathbf{R})$. We denote by $C^{\mu}(I, \mathbf{C})$ the totality of complex-valued functions defined and of class C^{μ} on I.

A d-dimensional row vector $\boldsymbol{x}$ with components $x_{\rho} \in \mathbf{C}$ $(\rho=1, 2, \cdots, d)$ will be denoted by

$$\boldsymbol{x}=(x_1, x_2, \cdots, x_d)$$

and a d'-dimensional column vector $\boldsymbol{y}$ with components $y_{\sigma} \in \mathbf{C}$ $(\sigma=1, 2, \cdots, d')$ by

$$\boldsymbol{y}=\begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_{d'} \end{pmatrix}=\operatorname{col}(y_1, y_2, \cdots, y_{d'}).$$

Now, let $B(t)$ be a square matrix of degree n:

$$B(t)=\begin{pmatrix} b_{11}(t) & b_{12}(t) \cdots b_{1n}(t) \\ b_{21}(t) & b_{22}(t) \cdots b_{2n}(t) \\ \vdots & \vdots \quad\quad \vdots \\ b_{n1}(t) & b_{n2}(t) \cdots b_{nn}(t) \end{pmatrix},$$

where $b_{jk}(t) \in C^{\mu}(I, \mathbf{C})$ $(j, k=1, 2, \cdots, n)$, and let us assume, throughout this paper, that for a positive integer $s: 1 \leqq s \leqq n-1$, a condition

$$\operatorname{rank} B(t)=n-s \ (=r) \tag{1}$$

is satisfied on the interval I, and further let us consider a homogeneous linear matrix equation

$$B(t)P(t)=O, \tag{2}$$

where $P(t)$ is an $n \times s$ matrix:

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