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DIFFERENTIAL EQUATIONS IN THE ALGEBRA OF C -GENERALIZED FUNCTIONS

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We consider the Cauchy problem for a system of linear differential equations whose coefficients are derivatives of functions of bounded variation. The problem is immersed in the space of Colombeau generalized functions. If the coefficients are derivatives of step functions, we find an explicit solution $\mathcal{R}(\varphi_\mu, t)$ of the Cauchy problem in terms of representatives, and the limit of the solution as $\mu \rightarrow +0$ is defined to be the solution of the original problem. In this way, we obtain a densely defined (on the space of regulated functions) operator \mathbf{T} , which associates the Cauchy problem with its solution. Next, using a known topological result on continuous extension, we extend \mathbf{T} to the operator $\widehat{\mathbf{T}}$ defined on the entire space of functions of bounded variation. It turns out that the solution is a regulated function.

Keywords: regulated functions, functions of bounded variation, distributions, Colombeau generalized functions, systems of differential equations.

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