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On the asymptotic behavior of solutions of inhomogeneous boundary transport processes

Communication Info

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Abstract

This work investigates the solution's behavior for a class of transport processes on networks, characterized by space-dependent velocities and edge absorption, coupled with inhomogeneous vertex Kirchhoff's conditions. The problem is reformulated within the framework of inhomogeneous boundary evolution equations, allowing a variation of constants formula expressing the mild solution. Assuming asymptotically almost periodic (AAP) exogenous terms on Banach space and on a boundary space respectively, we prove that every bounded solution on half-line is likewise AAP. Moreover, we identify conditions on the initial data that yield AAP behavior. These theoretical results are applied to the network model, ensuring the existence and uniqueness of AAP solutions. Finally, we illustrate our findings with numerical simulations, confirming their practical applicability.
Our approach combines tools from semi-group theory, Greiner's method, spectral theory, numerical analysis...

References

[1] T. Akrid, A. Elazzouzi, A. Ouhinou. Asymptotic almost periodicity of bounded solutions for some partial functional differential equations with delay. Discrete Contin. Dyn. Syst. Ser. S 18 (2025), no. 1, 29p.
[2] T. Akrid, M. Baroun. μ-pseudo almost periodic solutions to some semi linear boundary equations on networks. Afr. Mat. 35 (2024), no. 1, paper No. 10, 25 pp.
[3] A. B´atkai, M. K. Fijav˘z, A. Rhandi. Abstract Boundary Delay Systems and Application to Network Flow. Math. Methods Appl. Sci. 49 (2026), no. 1, 11p.
[4] M. K. Fijav\~{z}, A. Puchalska. Semigroups for dynamical processes on metric graphs. Philos. Trans. Roy. Soc. A 378 (2020), no. 2185, 20190619, 16 p.
[5] C. Budde, M. K Fijavž. Well-posedness of non-autonomous transport equation on metric graphs. Semigroup Forum 108 (2024), no. 2, 16p.