

Maximum principles for periodic solutions of the Telegraph equation

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Consider the space of doubly periodic functions

$$u : \mathbb{T} \times \mathbb{T}^N \rightarrow \mathbb{R}, \quad u = u(t, x)$$

and the differential operator

$$\mathcal{L}u = u_{tt} + cu_t - \Delta_x u$$

where $c > 0$ is a fixed constant. Given a parameter $\lambda \in \mathbb{R}$, we say that $\mathcal{L} + \lambda$ has a maximum principle if the differential inequality $\mathcal{L}u + \lambda u \geq 0$ implies $u \geq 0$. Notation: $\mathbb{T} = \mathbb{R}/2\pi\mathbb{Z}$.

This maximum principle on the torus was discussed in collaborations with A. Robles, J. Mawhin and J. Campos. The results appeared in a series of papers published between 1998 and 2008. I will present these old results and some new questions.