An inverse problem for 1d periodic differential operator of high order

Vadim Tkachenko, Ben-Gurion University of the Negev

An operator from the title is of the form

$$L = \frac{d^{2n}}{dx^{2n}} + \sum_{k=0}^{n-1} \frac{d^k}{dx^k}\, p_k(x) \frac{d^k}{dx^k}, \qquad x \in R, \tag{1}$$

with real-valued T-periodic functions $p_k \in R$ such that $p^{(k)}(x) \in \mathcal{L}2[0,T], k = 0, ..., n-1$.

We found that if the characteristic polynomial of L coincides with that of the trivial operator

$$L_0 = \frac{d^{2n}}{dx^{2n}} \tag{2}$$

then $L = L_0$.

This statement extends to arbitrary $n \geq 1$ the pioneering result by V. Ambartsumyan [1] dated back to 1929 and the result for $n = 2$ reported in [2].

References

1. V. Ambartsumyan, Zeitschrift für Physik, 1929, Bd.53, 690-695.

2. V. Tkachenko, Abstracts of the 102th Statistical Mechanics Conference, Rutgers University, 2009.