Invent. math. 138, 227 (1999)
Digital Object Identifier (DOI) 10.1007/s002229900014

Inventiones mathematicae

Erratum

The inverse problem for the Hill operator, a direct approach

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Invent. math. 129, 567–593 (1997)

Oblatum 2-IV-1999 & 27-IV-1999 / Published online: 5 August 1999

The proofs of the main theorems were based on Theorem 5.1 about nonlinear functional analysis. In this abstract theorem we claim that the mapping $f : H \to H_1$ is an isomorphism. Unfortunately, this theorem is not correct and we have to add the following assumption

Condition v). There exists a linear isomorphism $J : H \to H_1$ *such that* $(f(V) - JV, e_n)_1 = O(1/n)$*, as* $n \to \infty$ *uniformly on bounded subsets of* H.

Additional part in the proof of Theorem 5.1. We must show that the topology on M_m, generated by the norm $\|\cdot\|$, coincides with the topology on M_m induced by the weak topology of H, that is, weak convergence implies strong convergence.

First, we prove the compactness of the mapping $F \equiv f - J$. Indeed, each component $F_n(\cdot) \equiv (F(\cdot), e_n)$ is compact since $(f(\cdot), e_n)$ and $(J\cdot, e_n)$ are compact. Then using Condition v) we deduce that $F : H \to H_1$ is compact. Second, assume that $V_p \to V_0$ weakly, as $p \to \infty$ and $V_p \in M_m$, $f(V_p) \in K_m$, $p \geq 1$. Then by Condition iv), $y_p \equiv f(V_p) \to y_0 = f(V_0)$ strongly. We have $y_p = JV_p + F(V_p)$ and hence $V_p = J^{-1}(y_p - F(V_p)) \to V_0$ strongly. □

The main results remain true since, in fact, we checked Condition v) in our paper. Indeed, relations (3.38), (3.20), (3.30), (3.25), (3.10–11) show that the mappings h, l, μ, M, L satisfy Condition v).

The authors would like to thank Prof. J. Voigt for pointing out the error.