UCH O'LCHAMLI KUBIK PANJARADAGI IKKI BOZONLI SISTEMAGA MOS DISKRET SHREDINGER OPERATORNING DISKRET SPEKTRI

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Annotatsiya: d=3 uchun uch o'lchamli kubik panjaradagi ikki bozonli sistemaga mos diskret Shredinger operatorning diskret spektri minmaks prinspi orqali o'rganilgan.
Kalit so'zlar: diskret Shredinger operatorlari,minmaks prinspi,diskret spektr, hamiltonianlar, dispersion munosabatlar, xos qiymatlar.

Har bir $n \quad 1$ uchun quyidagilarni aniqlaymiz

$$e_n(k;\mu,\lambda) := \sup_{\phi_1,\ldots,\phi_{n-1} \quad L^{2,e}(\mathrm{T}^2)} \ \inf_{\psi \quad [\phi_1,\ldots,\phi_{n-1}]^{\perp},\|\psi\|=1} (h_{\mu\lambda}(k)\psi,\psi)$$

va

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Minmaks prinsipiga ko'ra ushbu $e_n(k;\mu,\lambda) \quad m(k)$ va $E_n(k;\mu,\lambda) \quad M(k)$ tengsizliklar o'rinli. Bundan tashqari, $\phi_1 \quad 1$, $\phi_2(p) = \cos p_1$ va $\phi_3(p) = \cos p_2$ larni tanlab, barcha $n \quad 4$ lar uchun $e_n(k;\mu,\lambda) = m(k)$ va $E_n(k;\mu,\lambda) = M(k)$ ekanligini hosil qilamiz.

1-lemma. $n \quad 1$ va $i \quad \{1,2,3\}$ bo'lsin. U holda ushbu

$$k_i \quad \mathrm{T} \mapsto m(k) - e_n(k;\mu,\lambda)$$

akslantirish $(-\pi,0]$ oraliqda o'smaydi $(-\pi,0]$ va $[0,\pi]$ oraliqda kamaymaydi. Xuddi shunday, ushbu

$$k_i \quad \mathrm{T} \mapsto E_n(k;\mu,\lambda) - M(k)$$

akslantirish $(-\pi,0]$ oraliqda o'smaydi $(-\pi,0]$ va $[0,\pi]$ oraliqda kamaymaydi.

Isbot. Umumiylikni buzmasdan, $i=1$ deb faraz qilamiz. $\psi \quad L^2(\mathrm{T}^3)$ ni quyidagicha olamiz

$$((h_0(k) - m(k))\psi,\psi) = \int_{\mathrm{T}^3} \sum_{i=1}^{3} \cos\frac{k_i}{2}(1-\cos q_i)\,|\psi(q)|^2 \mathrm{d}q.$$

Shunday qilib, ushbu $k_1 \quad \mathrm{T} \mapsto ((h_0(k) - m(k))\psi,\psi)$ akslantirish $(-\pi,0]$ oraliqda o'smaydi va $[0,\pi]$ oraliqda kamaymaydi. $v_{\mu\lambda}$ operator k ga bog'liq bo'lmaganligi sababli, $e_n(k;\mu,\lambda)$ aniqlanishiga ko'ra $k_1 \quad \mathrm{T} \mapsto e_n(k;\mu,\lambda) - m(k)$ akslantirish $(-\pi,0]$ oraliqda kamaymaydi va $[0,\pi]$ oraliqda o'smaydi.

$k_i \mapsto E_n(k;\mu,\lambda) - M(k)$ hol shunga o'xshash ko'rsatiladi.

Foydalanilgan adabiyotlar ro'yxati:

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