最新目录 | 下期目录 | 过刊浏览 | 高级检索　　◀◀ Previous Articles | Next Articles ▶▶

# 含单势垒量子隧穿结构电子稳恒输运中的接点效应

田 英[1]，　全 军[2]

1. 湛江师范学院~~博雅教育中心, 广东~~湛江 524048;　2. 湛江师范学院~~物理科学与技术学院, 广东~~湛江 524048

# Contact effect of quantum tunneling structure with single barrier in dc electron transport

TIAN Ying[1], QUAN Jun[2]

1. Center of liberal education, Zhanjiang Normal University, Zhanjiang Guangdong 524048, China;　2. School of Physics Science and Technology, Zhanjiang Normal University, Zhanjiang Guangdong 524048, China

- 摘要
- 参考文献
- 相关文章

全文: PDF (296 KB)　HTML (1 KB)　输出: BibTeX | EndNote (RIS)　背景资料

摘要 基于散射矩阵理论和费米-托马斯近似，通过对含单势垒的量子隧穿结构的研究，得到了稳恒输运中介观结构的电导特性. 结果表明，稳恒条件下接触效应对介观体系中的电子透射以及内部特征势有明显的影响；电势降所呈现的电导特性与经典电路中的基尔霍夫定律相违背，整个介观体系的电阻不能简单地视为接触电阻和散射电阻串联，必须考虑接点和介观器件间的量子相干性. 因此，接点效应对于进一步研究介观体系中的电子输运起到非常重要的作用

关键词： 电子输运　介观体系　散射矩阵理论　费米-托马斯近似

Abstract： In frame of the scattering-matrix theory and Fermi-Thomas approximation, we had investigated the conductance properties of mesoscopic structure in dc case by employing a quantum tunneling structure with single barrier. Results clearly indicate that, the contact effect has notable affection on the transmission probability of electrons and the distribution of internal potential in mesoscopic system; even though dc case, the behaviors of conductance displayed in potential drop conflict with the Kirchhoff's laws in classical circuit, and the total resistance of the mesoscopic system cannot be expressed as contact resistance in series with 'scatterer' resistance. So the quantum coherence between contacts and devices is worth considering, the role of contacts effect is important for further investigation of the electron transport in mesoscopic system.

Key words: electron transport　mesoscopic system　scattering-matrix theory　Fermi-Thomas approximation

服务

- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- E-mail Alert
- RSS

作者相关文章

引用本文:

. 含单势垒量子隧穿结构电子稳恒输运中的接点效应[J]. 华东师范大学学报(自然科学版), 2013, 2013(3): 186-193.

. Contact effect of quantum tunneling structure with single barrier in dc electron transport[J]. Journal of East China Normal University(Natural Sc, 2013, 2013(3): 186-193.

[1]　　{1}

[2]　　B\"{U}TTIKER M. Capacitance, admittance, and rectification

[3]    properties of small conductors [J]. Journal of Physics: Condensed

[4]    Matter, 1993, 5: 9361.

[5]    {2}

[6]    B\"{U}TIKER M. Four-Terminal Phase-Coherent Conductance [J]. Phys

[7]    Rev Lett, 1986, 57: 1761-1764.

[8]    {3}

[9]    PR\^{E}RE A, THOMAS H, B\"{U}TIKER M. Dynamic admittance of

[10]    mesoscopic conductors: Discrete-potential model [J]. Phys Rev B,

[11]    96, 54: 8130-8143.

[12]    {4}

[13]    B\"{U}TIKER M, PRETRE A, Thomas H. Dynamic conductance and the

[14]    scattering matrix of small conductors [J]. Phys Rev Lett, 1993, 70:

[15]    14-4117.

[16]    {5}

[17]    LIU H C. Analytical model of high-frequency resonant tunneling: The

[18]    first-order ac current response [J]. Phys Rev B, 1991, 43:

[19]    538-12548.

[20]    {6}

[21]    CHEN L Y, TIGN C S. Ac conductance of a double-barrier resonant

[22]    tunneling system under a dc-bias voltage [J]. Phys Rev Lett, 1990,

[23]    : 3159-3162.

[24]    {7}

[25]    FU Yaotian, SCOTT C. Dudley. Quantum inductance within linear

[26]    response theory[J]. Phys Rev Lett, 1993, 70: 65-68. crossref

[27]    {8}

[28]    MASLOV D L, STONE M. Landauer conductance of Luttinger liquids with

[29]    leads. [J]. Phys Rev B, 1995, 52: R5539-R5542. crossref

[30]    {9}

[31]    PONOMARENKO V V. Renormalization of the one-dimensional conductance

[32]    in the Luttinger-liquid model [J]. Phys Rev B, 1995, 52:

[33]    R8666-R8667.

[34]    {10}

[35]    SAFI I, SCHULZ H J. Transport in an inhomogeneous interacting

[36]    one-dimensional system [J]. Phys Rev B, 1995, 52: R17040-R17043.

[37]    {11}

[38]    YACOBY A, STORMER H L, WINGREEN N S, et al. Nonuniversal conductance

[39]    quantization in quantum wires [J]. Phys Rev Lett, 1996, 77:

[40]    12-4615.

[41]    {12}

[42]    QUAN J, YU Y B, TANG Y H. Role of wide contacts in the ac response

[43]    of a double-barrier structure [J]. Phys Rev B, 2006, 73:

[44]    5314-195320.

[45]    {13}

[46]    QUAN J, TIAN Y, ZHANG J, et al. Dynamic conductance of a ballistic

[47]    quantum wire [J]. Physica B: Physics of Condensed Matter, 2011, 406:

[48]    07-1611.

[49]    {14}

[50]    GABELLI J, FEVE G, BERROIR J M, et al. DC Violation of Kirchhoff's

[51]    laws for a coherent \textit{RC} circuit [J]. Science, 2006,

[52]    3(5786): 499-502.

[53]    {15}

[54]    GASPARIAN V, CHRISTEN T, B\"{U}TIKER M. Partial densities of states,

[55]    scattering matrices, and Green's functions [J]. Phys Rev A, 1996,

[56]    : 4022-4031.

没有找到本文相关文献