Principle and experimental results of normal temperature superconductivity

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Abstract

Current is usually considered to be formed by the directional movement of charge. In addition to this classical explanation of electromagnetism, from the perspective of physical phenomenon, current also has "wave" conduction characteristics. Understanding current from the "wave" characteristics and conducting corresponding experimental verification can give us a deeper understanding of current. According to the "fluctuation" characteristics of current and the "lossless" propagation principle of optical fiber, the research team conducted 613 experiments on the combination of different conductor materials with PN junction materials of different materials and different junction depths. Under the conditions of boron-phosphorus type PN junction material, junction depth of 0.356um, wire cross-sectional area of 25mm^2, at room temperature, The resistance value of the conductor material is close to zero, and the nondestructive conduction of current in a real sense is realized near -32.3℃, without the help of external ultra-low temperature and other conditions, which lays a new theoretical and experimental foundation for the human energy revolution.

Keywords: Normal temperature superconductivity, Current vibration wave, PN junction

1 Introduction

Physics is also known as a science of observation and experiment. Through the observation and analysis of natural or experimental phenomena, human beings summarize physical laws and apply them to production practices, which makes physics achieve great success and contributes to the progress of human science and technology. We can make full use of this basic feature of physics, starting from the physical phenomenon itself, to carry out "theoretical exploration" and experimental test of current and superconductivity and other related issues. Modern theories of electromagnetism hold that electric currents are formed by the directional movement of electrons in a conductor. If understood according to this view, the speed of electrons would reach the speed of light, which is impossible and not allowed. In fact, according to the experimental detection, the moving speed of the electrons in the wire is very slow, which is far from the propagation speed of the current. People prefer to believe that the speed of light transmission mechanism of the current is caused by the propagation of electromagnetic wave, so only in terms of the physical phenomenon, we assume that the current is also a kind of "wave". Although it does not fit the definition of modern physics to think of current as a wave, understanding and attempting to apply this "wave" phenomenon does not contradict the original intention of physics as an observational and experimental science. From this particular physical point of view, let us think of current as "current wave" or "current vibration wave", and this assumption is essential for understanding the normal temperature superconductivity we are going to discuss.

2 Principle and experimental results of normal temperature superconductivity

2.1 Current and resistance in the "wave" view

From the unique physical perspective of physical phenomena, current can be regarded as a directional "vibration wave" in the conductor, and resistance can be regarded as the efficiency of atoms in the conductor to propagate "current vibration wave". Atoms in a conductor generally transfer vibrations of electric current more efficiently than those in a semiconductor or insulator, just as a steel ball transmits vibrations more efficiently than a football or a balloon. Atoms conduct both simple harmonic vibrations of vibrating waves of electric current and chaotic thermal vibrations. When the temperature increases, the thermal vibration of atoms intensifies, the disorder of atomic vibration increases, and the transmission effect of the current vibration wave becomes worse, as shown by the increase of resistance. When the temperature decreases, the thermal vibration of atoms slows down, and the amplitude of atoms leaving the equilibrium position becomes smaller. At this time, the transmission effect of atoms to the current vibration wave is enhanced, which is manifested as the reduction of resistance. When the temperature is close to absolute zero, the effect of atomic thermal vibration on the conduction of current vibration wave is minimal. At this time, atoms can transfer almost all the energy of current vibration wave, and there is basically no thermal vibration energy loss. Thus, they are superconducting.

2.2 How diodes work in the "wave" view

The principle of the working mechanism of diode is the key factor to achieve normal temperature superconductivity, and we focus on the content. From the perspective of mechanics, electric field can be regarded as the gradient distribution field of force field, and the mechanical action between two objects is essentially the result of the interaction of electric field force. This force field exists at the contact surface of any two objects due to thermal motion, such as friction and the Casimir effect (the obvious attraction between two parallel metal plates that are close to each other but not touching). From the "wave" characteristics of current and the two concepts of force field on the contact surface of two objects, we can understand the working principle of diode from the perspective of physical representation, which is more intuitive than electromagnetism to explain the working principle of diode by using "the diffusion current caused by the difference of carrier concentration on both sides of PN junction and the electrical balance current caused by the self-built electric field".

The crystal diode is divided into P-type region, N-type region and PN junction region, which is a single conductive electrical component. There is an extremely narrow region called PN junction between the P region and the N region. This extremely narrow region is also called space charge region or space electric field region by modern physics system. From the mechanical point of view, the PN junction is also a gradient distribution field of force field. We explain the working mechanism of diode mainly from the current "wave" point of view and the existence of force field on the contact surface of two objects. From the perspective of "wave" of current, the propagation of current is very similar to that of light wave. We can still understand the propagation mechanism of current in diode more directly only from physical representations or physical phenomena. P-zone material and N-zone material in diode can be regarded as two different media of current vibration wave. The working principle of diode has the same action mechanism as the reflection and refraction of light in different media. The "transmission" phenomenon occurs when the current vibration wave enters the N region from the P region, while the "total reflection" phenomenon occurs when the current vibration wave enters the P region from the N region, which makes the current wave energy cannot be transferred to the P region, thus showing the single wizard connectivity of the diode.

2.3 Theoretical model of normal temperature superconductivity

The principle of superconductivity is to reduce as much as possible the thermal energy loss generated by the conductor atoms. In order to reduce the thermal energy loss caused by the propagation of current or current vibration wave in the conductor, we can use the "transmission" and "total reflection" of the diode, these apparent physical mechanisms to achieve this goal. From the perspective of "wave" representation characteristic physics of current, the unidirectional universality of diode can be regarded as the current vibration wave can propagate from P region to N region, but cannot propagate from N region to P region. According to the working principle of PN junction from the perspective of "wave", the current propagating from P region to N region is the result of the transmission of current vibration wave, while the current cannot propagate from N region to P region because of the "total reflection" of current vibration wave. P region is like a mirror, but it is not "transparent". When the forward current vibration wave is transmitted from the wire to P region, The atoms in the P-zone actually act as the source of the subsequent current vibration wave. At this time, the current vibration wave will be "transmitted" at the PN junction and reach the N zone, where it will continue to propagate.

By looking at and applying this mechanism from the physical representation of "wave" of current and diode, we can design lossless superconducting cables. We only need to create a PN junction around the wire, so that the current vibration wave in the wire can only move along the wire. The PN junction covered around the wire can prevent the energy of the current vibration wave from dissipating due to thermal vibration. The current vibration wave can only be transmitted in the space wrapped by the PN junction, and the lateral thermal vibration loss will be fully reflected back by the P-type area material. The N-type material is adjacent to the wire, outwards is the PN junction, and the outermost layer is the P-zone material. This is the same principle behind the efficient propagation of light waves through optical fibers. We only need to combine these thin wires with PN junction coating into one thick wire to produce superconducting cable. This PN junction architecture superconducting cable has very high current conduction efficiency at room temperature, greatly reducing the heat loss of electric energy.

2.4 Experiment

The principle of normal temperature superconducting materials is shown in Figure 1:

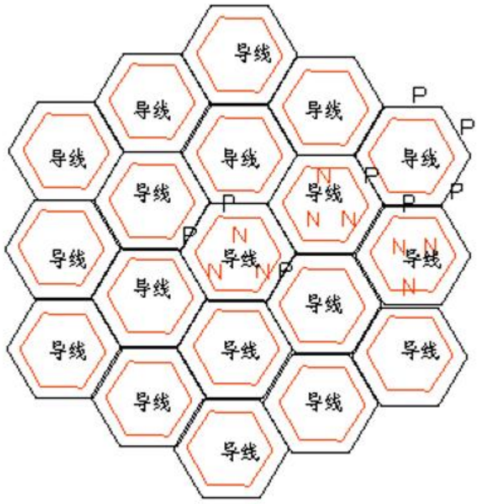

Fig. 1. Schematic diagram of normal temperature superconductivity

Above is the schematic diagram of the cross section of the superconducting cable. Each thin wire inside the cable has the exact same structure. Directly in contact with the thin wire is the N-zone material, outwards is the PN zone material, and the outer layer is the P-zone material. Can be simply understood as the enamelled wire outer paint into PN junction coating. The PN junction itself wrapped in the outer layer of the wire also has certain conductivity, but this will not have a fundamental impact on the conduction of current, because the PN junction around the wire is actually a layer of extremely thin tube, equivalent to a layer of thin-walled tube of PN junction material around the wire, this extremely thin semiconductor material after a long conduction distance, its resistance is close to infinity. Its conductivity is also close to that of an insulator. In addition, it should be noted that in the production process, the conductor at the beginning and end of the superconducting cable cannot cover the PN junction coating material, which is the same principle as the enamelled wire, otherwise it is equivalent to connecting the ordinary wire with the lacquer material of the outer layer of the enamelled wire. This causes the superconducting cable to fail to function properly.

3 Experimental system and measurement results

Experimental data of resistance value are shown in Table 1 (20℃、Kilometer length resistance value Ω)

Cross-sectional area of wire	Ordinary copper conductor	Copper conductor+Ge base, In-Sb PN junction Superconducting cable (PN junction depth0.43 μm)
$1mm^2$	18.13	0.07
$4mm^2$	4.61	0.016
$10mm^2$	1.83	0.0081
$16mm^2$	1.15	0.0063
$25mm^2$	0.73	0.003
$50mm^2$	0.39	0.0018
$70mm^2$	0.26	0.0015
$95mm^2$	0.19	0.0012

Fig. 2. Experimental data of Ge base, In-Sb PN junction,

resistance of superconducting material at room temperature

Experimental data of resistance value are shown in Table 2 (-32.3℃、Kilometer length resistance value Ω)

Cross-sectional area of wire	Ordinary copper conductor	Copper conductor+Si base, B-P PN junction Superconducting cable (PN junction depth0.356 μm)
$1mm^2$	15.26	0.0033
$4mm^2$	3.72	0.0007
$10mm^2$	1.43	0.0003
$16mm^2$	0.97	0.0001
$25mm^2$	0.61	0
$50mm^2$	0.32	0
$70mm^2$	0.21	0
$95mm^2$	0.16	0

Fig. 3. Experimental data of Si base, B-P PN junction,

resistance of superconducting material at −32.3℃

4 Discussion section

In principle, the "incident Angle" at which a vibrating wave of current enters a wire also matters for superconductivity, This is also very important for the total reflection of the current vibration wave at the PN junction, which is the same reason that the incidence Angle is greater than the critical Angle for laser propagation in optical fiber. In view of the limited experimental conditions, the influence of this factor on the superconducting effect needs to be verified by further experiments.

5 conclusion

It is not against the original intention of physics as an experiment and observation to understand the working principle of current and diode from physical phenomena or physical representations. The theoretical basis of superconductivity can be more intuitively understood by using the "wave" conduction characteristics of current and the working mechanism of "refraction" and "total reflection" of diode. We have proved the correctness of the hypothesis by many experiments.