ROTATING LORENTZ TRANSFORMATION AND UNIFICATION OF FORCES

旋转洛伦兹变换和力的统一

YIN RUI
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内 容 提 要

本文把狭义相对论的洛伦兹变换推广到两参考系相对匀速旋转的运动状态中，给出了旋转洛伦兹变换，继而导出了临界圆外域上的旋转洛伦兹变换。在此基础上提出：

1. 临界圆外域上存在时空互易。从而，即使在广义相对论的范畴中，质量和能量也不可能以超过光的速度传播。

2. 自旋带电粒子的场不是平方反比有心场，库仑定律给出的作用力的方向和静电相互作用的实际方向是相反的。

3. 粒子的波粒二象性中，粒子性是固有的，波动性与参考系的选择有关。在适当选择的参考系中，波动性并不存在。

4. 量子力学的某些结论，需要在广义相对论效应的基础上作必要的修正，并且修正的范围很广，连普朗克常数的值都包括在内。

5. 强力、弱力、磁力和引力只不过是电力在不同运动状态下的不同表现。从本质上看，物质世界中的基本力只有一种，那就是电力。

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ABSTRACT

Deducing the Lorentz transformation of special relativity to the situation where one frame has an uniform rotation relative to another, the rotating Lorentz transformation (RLT) has been introduced in this book. And so has the RLT on the outside of critial circle. Based on these, following points have been proposed:

1. There is the space-time exchange on the outside of critical circle, so that the mass and energy can not be propagated by the speed over light even if in the area of general relativity.

2. The field of a spin charged particle is not the square inverse proportional field. The direction of the real Coulomb's force is opposite to that given by the Coulomb's law.

3. In the particle-wave duality of a particle, the particle property is inherent but the wave property depends on the frame. It will lose the wave property if the frame is suitably chosen.

4. Some conclusions of quantum mechanics should be modified based on the general relativity, even if the Planck's constant needs modifying also.

5. The strong, weak, magnetic and gravitational forces are all the different exhibitions of the electric force in different moving states. In essence, there is only one kind of force in the material world. It is the electric force.

Preface

My speciality is Electronic Engineering. In the last 15 years I have engaged in the Biomedical Engineering. First, I did some research work on NMR imaging with Professor P. Lauterbur, while I was in State University of New York (SUNY) at Stony Brook. Then, did some research work on Electro-Chemical Therapy (ECT) of cancer with Professor Y. L. Xin and Professor B. Nordenström. Since 1989, I have researched the Magnetic Resonance Therapy (MRT) of cancer, which is proposed and designed by myself. Since 1994, the remarkable and definite curative effect has been gotten. The Judgement, which had been given in 1996 by Beijing Chinese-Japanese Friendship clinical institute, said that "it can kill 96% cancer cells in Vivo during 1.5 hours and can not find any effect to the normal cells". But for beating cancer thoroughly, the kill ratio for cancer cells should be more than 99%. How can I increase it? I had to research its mechanism again. This time I began with relativity and quantum mechanics. As the research work had been gone deeper and deeper, some of problems had been found not only in the MRT of cancer but also in physics, which can be solved by neither Lorentz transformation nor quantum mechanics. Then, I got an idea: "There are two kinds of basic motions in physical world, along a straight line and along a circle. The special relativity is based on the motion along a straight line. Why don't deduce the Lorentz transformation to the situation where one frame is uniformly rotating relative to another? There are two apples. One is red, the other is green.

Everybody would notice the red one first, but the green one is apple also. And now it is the time to pay some attention to the green one".

I did this work. The results on this research are exhibited in Chapter 2,3 and 4. They are so different from that we thought. To my surprise, these problems can be solved only based on algebra. They say that the nearer essence, the simpler. It looks as if they are right.

Finally, the author acknowledges the help it has had from my guides,my teachers and friends. Especially, I wish to thank Dr. Chen-ning Yang and CEEC of SUNY as well as Grumman Aerospace cooperation, who invited and supported me to do some research work in SUNY at Stony Brook.

Then, I'd like to say special hello to Master H. H. Wang, who is the responsible editor of this book.

前　言

笔者的本专业是电子工程。近15年来一直从事生物医学工程的研究。先是随P. Lauterbur教授做磁共振成像的研究，后又随B. Nordenström和辛育龄教授研究电化学治癌，1989年开始独立开展磁共振治癌的研究。虽1989年志愿受试的晚期癌症患者有的至今健在，但此项研究取得明显成果是在1994年以后。1994—1996的两年中，北京中日友好临床医学研究所用笔者所研制和不断改进的治疗仪器对百余只鼠进行了动物试验和细胞学研究，得出了此治疗仪器能杀死体内96%以上的癌细胞，同时又不影响正常细胞的结论。但毕竟还有残余的癌细胞存留体内，为了彻底战胜癌症，1994年开始笔者又把研究重点转回到对磁共振治癌的机理的探讨。这一次是从自学相对论和量子力学入手，随着学习的不断深入，笔者产生了一个想法：物理世界中有两种基本运动，即匀速直线运动和匀速旋转。狭义相对论用洛伦兹变换把匀速直线运动中的物理现象分析得淋漓尽致，尤其是由库仑力导出磁力简直是妙不可言。能否把它推广到另一种基本运动——匀速旋转中去，并由库仑力导出强力或弱力呢？两个苹果，一红一青，人们先注意到红的，但青的也是苹果。现在是该关注青苹果的时候了。

经过几年的努力，得到了本书后三章所列出的结果，是否正确还要请物理学家们评定，如果本书的出版能对理论物理的发展起到哪怕是一点点作用，笔者也就深感欣慰了。

本书的撰写力求深入浅出，以便非物理专业的读者阅读。从另一层意义上看，在物理世界中，越是本质的东西，规律性就越强，描述它的数学工具也就越基础。

最后，笔者借此机会向老师和朋友们致谢，特别是向杨振宁博士和美中教育交流委员会(CEEC)的各位老师和格鲁门宇航公

司的朋友们致谢，是他们邀请和资助了我，使我有机会在（石溪）纽约州立大学参加了多项研究工作，步入了生物医学工程这一新的科技领域。本书中所收获的果实，是那时播下的种子。

对本书的责任编辑王海虹硕士顺致敬意。

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CHAPTER 1 REVIEW: THE LORENTZ TRANSFORMATION IN SPECIAL RELATIVITY

1.1 The Relativity Principle and the Universality of Light Speed c

'THERE ARE WHOLE CLASSES OF REFERENCE FRAMES WITH RESPECT TO WHICH THE LAWS OF PHYSICS HAVE PRECISELY THE SAME FORM'. This is so-called relativity principle. For example, in an inertial frame Σ a body with mass m is exerted by a force F, so that it gets the acceleration a. Then the equation of the Newtonian law of motion is $F = ma$. If this motion is measured in another inertial frame Σ', the mass, the exerted force and the acceleration of this body will become another set of values: m', F', a', but it is always kept that $F' = m'a'$.

In different frame the values of a same physical parameter are different. For example, the velocity of a body is u in frame Σ, and it is u' in frame Σ'. General speaking, $u \neq u'$, because Σ' has a constant velocity v with respect to Σ. But they can keep the formulas of physical laws in the same form . It is denoted that the values of a same physical parameter in different frames are definitely corresponding, and can be defined by some formulas. These formulas are so-called transformations. For example, the place transformation, the mass transformation, the

force transformation give the corresponding values of place, mass, force in different frames.

In Newtonian mechanics these formulas are given by Galilean transformations. If place and time are denoted by (x, y, z, t) in frame Σ, and by $(, x', y', z', t')$ in frame Σ'. Along x axis the frame Σ' has a constant velocity v with respect to frame Σ. And the origins of Σ and Σ' are chosen so as to coincide at $t = t' = 0$, as shown in Fig. 1-1. Then, the Galilean (space-time) transformation is defined as follows:

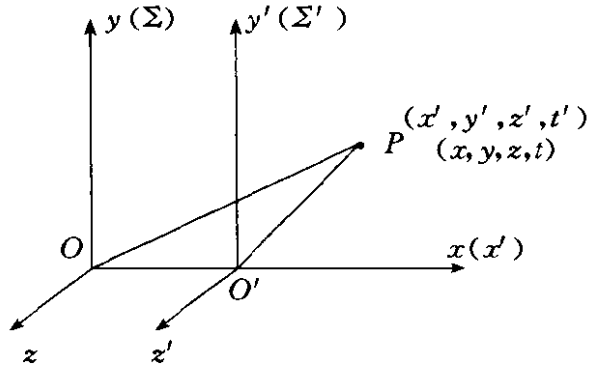

Fig. 1-1

$$\left.\begin{aligned} x' &= x - vt \\ y' &= y \\ z' &= z \\ t' &= t \end{aligned}\right\} \tag{1-1}$$

The inverse transformation is:

$$\left.\begin{aligned} x &= x' + vt' \\ y &= y' \\ z &= z' \\ t &= t' \end{aligned}\right\} \tag{1-2}$$

In mathematics, a pair of transformations should obey the forming law. This means that by transforming a set of original parameters, say (x, y, z, t), another set of parameters (x', y', z', t') can be gotten. Then, taking the inverse transform of this set of parameters (x', y', z', t'), the result should be the set of original parameters itself. Only in this case the pair of transformations are correct, this is so-called the forming law of a

pair of transformations. Now let us test the Galilean transformation by the forming law. First, rewrite the Eq. (1-1)and Eq. (1-2) into matrix form:

$$\begin{pmatrix} x' \\ t' \end{pmatrix} = \begin{pmatrix} 1 & -v \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ t \end{pmatrix} \qquad \begin{pmatrix} x \\ t \end{pmatrix} = \begin{pmatrix} 1 & v \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x' \\ t' \end{pmatrix}$$

Then, substituting the second equation for the right-hand side of the first equation, we have:

$$\begin{pmatrix} 1 & -v \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & v \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x' \\ t' \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x' \\ t' \end{pmatrix} = \begin{pmatrix} x' \\ t' \end{pmatrix}$$

It is equal to the left-hand side of the first equation, so that the Galilean transformation obeys the forming law. This example shows a way by which whether or not the transformation obeys the forming law can be tested. The criterion is that the product of two transforming matrices should be a unit matrix.

If a point event P in frame Σ' is moving along x' axis with a constant velocity w', i. e. $x' = x_0' + w't'$. According to the inverse transform, we have:

$$x = x' + vt' = x_0' + w't' + vt'$$

Then the velocity of P with respect to frame Σ is:

$$w = \frac{dx}{dt} = \frac{d}{dt}(x_0' + w't' + vt')$$

but $t' = t$, therefore $dt' = dt$, so

$$w = \frac{dx}{dt} = \frac{d}{dt'}(x_0' + w't' + vt') = w' + v$$

This is so-called Galilean velocity transformation. Generally it can be denoted as $w_x = w_x' + v$.

But this transformation is not agreement with lots of experiments. First, in 1898, the very famous experiment made by Michelson and Morley denied it. Then several physicists

repeated this experiment. But the results were more definite to deny the Galilean velocity transformation. A very convincing experiment was made by Alväger and etc.. It was to measure the speed of photons, emitted from decay of π^0 mesons in flight with respect to the lab frame with a velocity of 0.999 75c. Of course, with respect to the π^0 meson, the speed of the photons was c. But what about with respect to the lab frame? Was it 1.999 75c? The measured result by Alväger was $(2.997\ 7 \pm 0.004) \times 10^8$ m/s. It was excellent agreement with the value of $c = 2.997\ 5 \times 10^8$ m/s. From these experiments a very important conclusion has been introduced. This is: THE SPEED OF LIGHT IN EMPTY SPACE ALWAYS HAS THE SAME VALUE c. This is so-called the universality of light speed c.

Based on the relativity principle and the universality of light speed c, Einstein set up the special theory of relativity.

1.2 Lorentz Transformation

Here, we set up Lorentz transformation in a different approach, which will be used to set up another transformation in Chapter 3. This approach is based on the forming law of a pair of transformations. It can be separated into two steps:

STEP1. BASED ON THE GEOMETRY AND UNIVERSALITY OF c, SET UP TWO SETS OF EQUATIONS WHICH ARE NOT NORMAL.

The geometry is shown as Fig. 1-2. The space and time coordinates of a point event P are denoted by (x', y', z', t') in frame Σ', and by (x, y, z, t) in frame Σ. Along x axis the frame Σ' has a constant velocity v with respect to frame Σ. And the

origins of Σ and Σ' are chosen so as to coincide at $t = t' = 0$.

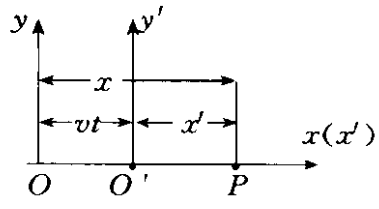

Fig. 1-2

It is always kept that $y' = y$ and $z' = z$. There is no need to mention them. Furthermore, for convenience, suppose the point event P is on the x axis, and a light signal is started out from origins at $t = t' = 0$. In frame Σ, It reaches P in the time $t = x/c$, during which the origin of frame $\Sigma'(O')$ has a shift of vt. Therefore: $x' = x - vt$. According to the universality of c, the time in which the light signal reaches P in frame Σ' is $t' = x'/c$. Divided the equation $x' = x - vt$ by c, we have:

$$\frac{x'}{c} = \frac{x}{c} - \frac{v}{c}t$$

Substituting $x'/c = t'$, $x/c = t$ to this equation, we get: $t' = t - vx/c^2$. Collecting these two equations together, we get a set of equations:

$$\left.\begin{aligned} x' &= x - vt \\ t' &= t - \frac{v}{c^2}x \end{aligned}\right\} \tag{1-3}$$

Then, suppose point P is at rest in frame Σ', and frame Σ has a motion along $-x'$ axis with a constant velocity v, we can get another set of equations:

$$\left.\begin{aligned} x &= x' + vt' \\ t &= t' + \frac{v}{c^2}x' \end{aligned}\right\} \tag{1-4}$$

Do the Eqs. (1-3) and (1-4) form a pair of transformations? Let us have a test. First rewrite them into matrix form: