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[Arabian Nights]——[Five Cycles] Examples and "Standard State" Research [Copy Link]

Tianfangmo

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Posted on 2017-7-1 23:15:46 | View only this author | View in reverse order

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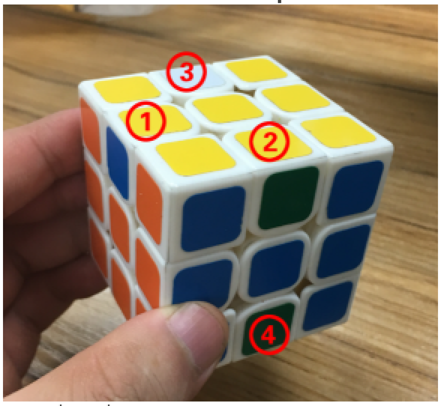
This post was last edited by Tianfangmo on 2017-7-5 13:16

The principle of the five cycles has been posted before. For details, please see: http://bbs.mf8-china.com/forum.php?mod=viewthread&tid=106969

Now let me use an example of the five cycles to help you understand, and finally talk about the differences between the five cycles and the three cycles.

First, consider UL as a buffer block, and **use five loops UL-UF-UB-DF-DB**. If we use the three-loop method to solve this case, there are two formulas: (UL-UF-UB) + (UL-DF-DB); and if we use the five-loop method, the formula is **: [LU'L'U', M2]** So how do we understand the five-loop method?



First, let's number the positions of UL UF UB DF DB as ①, ②, ③, ④, ⑤.

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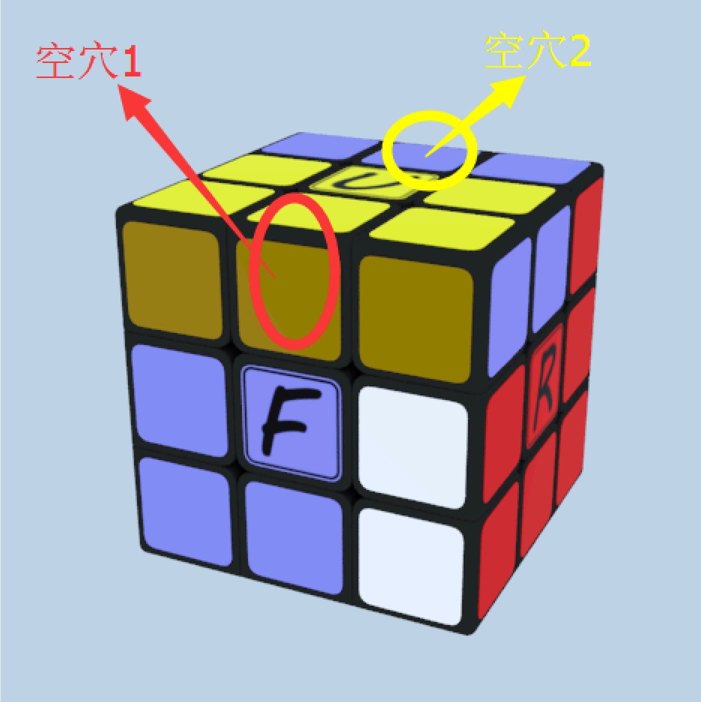
Note: The digital code marks the position, not the color block.

UF and UB positions, that is, ② and ③, are regarded as two empty positions (why these two positions, because only these two positions can allow DF and DB to reach directly through M2)



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Then the digital switch expression is A=①②→②③; B=⑤④→②③; A'=③②→②①; B'=③②→④⑤. It corresponds to the five-cycle switch diagram I posted before. Then the displacement of hue is: A①②→②③=UL→UF, UF→UB=UL-UF-UB three-edge exchange; B=⑤④→②③=DB→UF, DF→UB=M2 direct; A'③②→②①=UB→UF, UF→UL=UL-UB-UF three-edge exchange; B'③②→④⑤=UB→DF, UF→DB=M'2 direct. So that is to say, the formula of this five-cycle should be: [UL-UF-UB,M2] Compared with the two three-cycle solutions mentioned above, we can find that the three steps of BA'B' after the five-cycle are M2 UL=UL-UB-U M'2, which is the three-cycle UL-DF-DB. So the solution of the five-loop and three-loop is exactly the same. But it should be noted that although the solution is exactly the same, the formula is very different. First of all, the formulas of the three-loop UL-UF-UB and UL-DF-DB are more complicated. But the five-loop only needs to make A and A', that is, A=①②→②③ and A'=③②→②①, and cause two holes in the M layer. So my previous post said that many restrictions in the three-loop were removed. So if A=①②→②③ is three-loop, a three-loop formula like UL-UF-UB is needed, and after removing the restrictions, only the formula LU'L'U' is needed to form the transition group of the M layer with two holes. The same formula of A'=③②→②① is ULUL'. The formula of the five-loop case UL-UF-UB-DF-DB is [LU'L'U',M2].

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The full name of the five-cycle should be called "double-hole switch five-cycle". There are three qualifiers here , "double hole", "switch" and "five-cycle" are indispensable, because even if the conditions of double cycle and switch are met, the final formula is not necessarily a five-cycle, it may be a "double three-cycle" or a "double two-edge exchange", which involves the "standard state" of the five-cycle.

Take the five-cycle example in the first floor, [LU'L'U',M2], if M2 is replaced by M or M, that is, [LU'L'U',M'] or [LU'L'U',M], then the formula becomes "double two-edge replacement". And before, if M' in the formula [RU,M'] in the five-cycle principle is replaced by M2, that is, [RU,M2], then the formula becomes "double three-cycle". This situation never occurs in the three-cycle formula [U'RU,M'], for example, no matter whether M' in the formula is replaced by M or M2, the final formula must also be a three-cycle.

Here I will say more: three loops are actually "single hole switches". This single hole state has always been a controllable state that we pursue. The masters at home and abroad can derive formulas for blind twisting, such as the 818 formula of three blinds, the central three loops of four and five blinds, etc. The five loops are a "multi-hole" switch state after removing the "single hole" restriction . Like the "seven loops" and other switches, the switches at this time are more complex and uncontrollable. I believe that 99% of the three-loop researchers will "mistakenly" make five loops in the process of deriving the formula. I firmly believe that there must be a reason for the existence of the five loops. If we can accidentally make the five loops, then it must have a law. And the "standard state" of the five loops I am talking about today is the law of the five loops that we need to find!

Here we will explain in detail what the standard state of the five cycles is. First of all, the process of replacing M2 with M or M' in the formula [LU'L'U',M2] is the different manifestations of the non-hole block positions in the other five cycles being replaced with two hole positions, that is, UF and UB are hole positions. We call the UF position the "hole 1" position, and UB the " hole 2" position. Then M2 replaces the two edge blocks DF and DB to the hole 2 and hole 1 positions respectively. Then the step M' replaces the two edge blocks DF and UF to the hole 1 and hole 2 positions respectively. The step M replaces the two edge blocks DB and UB to the hole 2 and hole 1 positions. Note that M2 replaces the edge blocks in two non-hole positions to two hole positions; while M and M' replace the edge block in a non-hole position to a hole position, and the edge block in this hole position to another hole position. That is to say, M2 is a way of double hole displacement (temporarily called " complete replacement "); and M or M' is another way of double hole displacement (temporarily called " incomplete replacement "). (These two different ways are very important, and everyone should keep them in mind.)

Similarly, LU'L'U' and RU are also two different displacement modes (the hole position is still UF and UB). LU'L'U' corresponds to M or M', which is a " non-complete replacement " where one hole moves to another hole position (the edge block at the UF position moves to the UB position), while RU is a " complete replacement " where two blocks at non-hole positions move to two hole positions respectively (the edge block at the UL position moves to the UB hole 2 position, and the edge block at the FR position moves to the UF hole 1 position.) Comparing the two typical five-cycle formulas [LU'L'U',M2] and [RU,M], we will find that if we follow the standard writing of the switch formula [A,B] (the brackets correspond to the two steps AB in the switch ABA'B'), the latter follows the double-hole replacement method. The two formulas are : [LU'L'U',M2]=[non-complete replacement, complete replacement]; [RU,M]=[complete replacement, non-complete replacement]. That is to say, the standard state of the five-

cycle must be this "complete replacement" + "semi-complete replacement" state! ! !

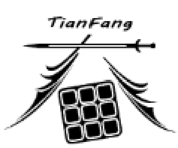
Understanding the standard state of "complete replacement" + "non-complete replacement" of the five-cycle is very important in the process of deriving the five-cycle formula . Here , I would like to mention that this standard state means that a standard state of the "double hole switch" will produce the five-cycle formula. (Other multi-hole switches such as the "three-hole switch" will also have standard states to produce seven-cycle and nine-cycle formulas, which will not be studied here.) So what if the double hole switch is not in the standard state of "complete replacement" + "non-complete replacement"? It was mentioned before that the final formula may be "double three cycles" or "double two-edge replacement", such as the formulas of the double hole switch [RU,M2] and [LU'L'U',M']. That is to say, if the state of the double hole switch is "complete replacement" + "complete replacement", then the formula generated is the "double three cycles" formula; if the state of the double hole switch is "semi-complete replacement" + "semi-complete replacement", then the formula generated is the "double two-edge replacement" formula . (A few words to say, many people asked me what to do when the five cycles are in the small cycle. In fact, this "double two-edge exchange" formula can perfectly solve the problem of the small cycle in the five cycles. I will not go into details here, and I will study it later when I have the opportunity.)

In fact, in addition to the two hole replacement methods I call "complete replacement" (the block at the double hole position is "completely" replaced by a non-hole block) and "semi-complete replacement" (the block at the double hole position is "not completely" replaced by a non-hole block), there is also a " mutual replacement " replacement method. For example, when UF and UB are both holes, making U2 is a "mutual replacement" situation. At this time, the blocks at the two hole positions are exchanged with each other , and "no other non-hole blocks" are involved in the replacement! So what kind of formula will the double hole switch produce when this "mutual replacement" double hole exchange method appears?

I will tell you the answer directly here. There are three possible results: the first state is "mutual replacement" + "mutual replacement", at which time the Rubik's Cube is in a restored state, see formula [U2,U2]; the second state is "mutual replacement" + "complete replacement", at which time the Rubik's Cube is in a "double two-edge replacement" state, see formula [U2,M2]; the third state is "no replacement at all" + "semi-complete replacement", at which time the Rubik's Cube is a three-order three-cycle (without considering the central hue), see formula [U2,M'].

Yes, the triple blind formula [U2,M'] is a switch formula, but to be more precise, it is a double hole switch triple loop formula!!! Here again, why the center is messed up when doing edge or wing edge triple loop formula in high-order blind twisting, that is because the formula cannot be guaranteed to be a double hole, because the center also participates in the switch conversion as a hole. If the center can be avoided from participating, then there will be no center confusion. The corner block triple loop completely avoids the center appearing in the hole.

Tianfangmo



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Posted on 2017-7-2 17:45:45 | View only this author #3

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Here we use diagrams to explain the switching method of the dual-hole switch.

First, draw five circles to represent the five blocks involved in the cycle. Assume that the positions of the two yellow blocks above are hole positions, called hole 1 and hole 2.

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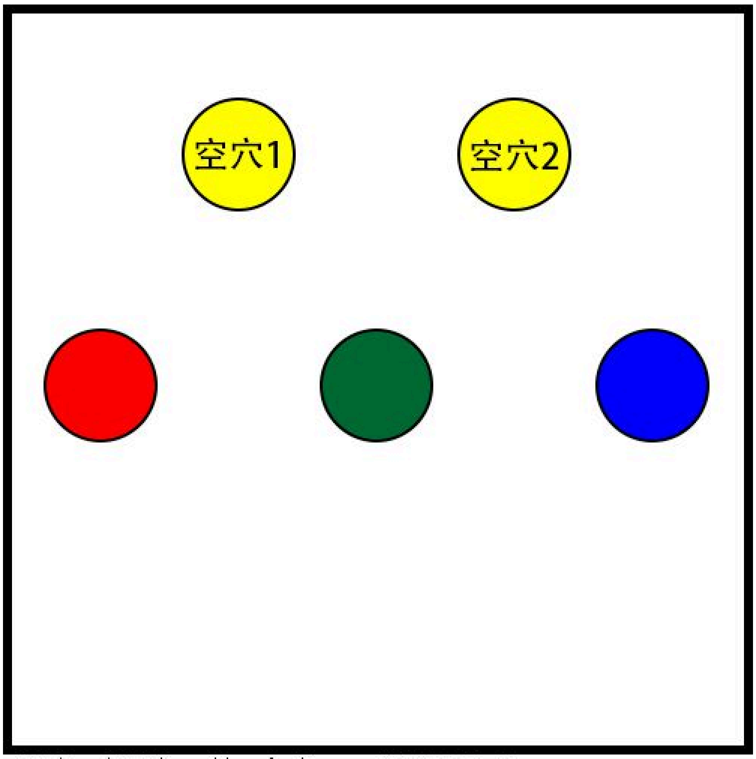
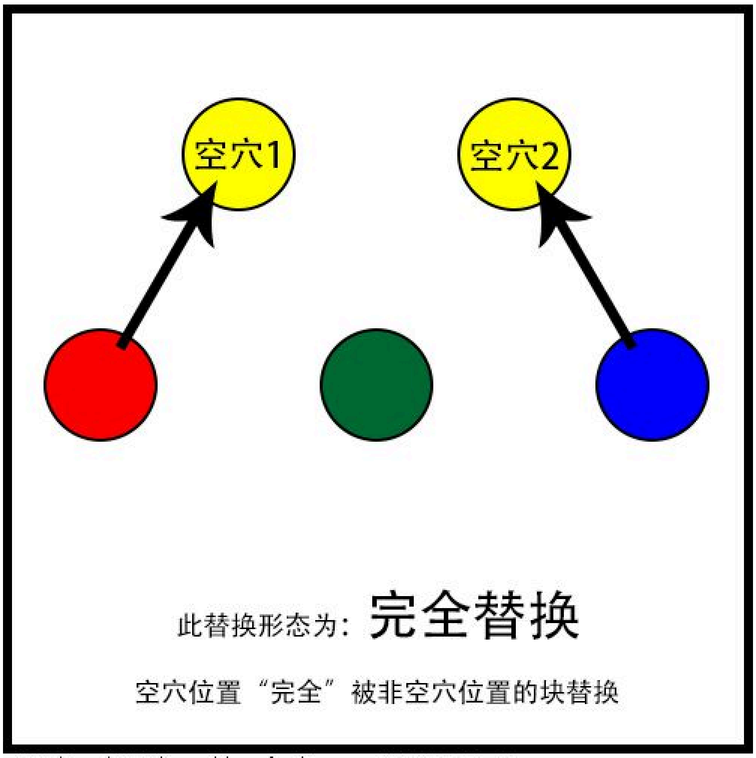
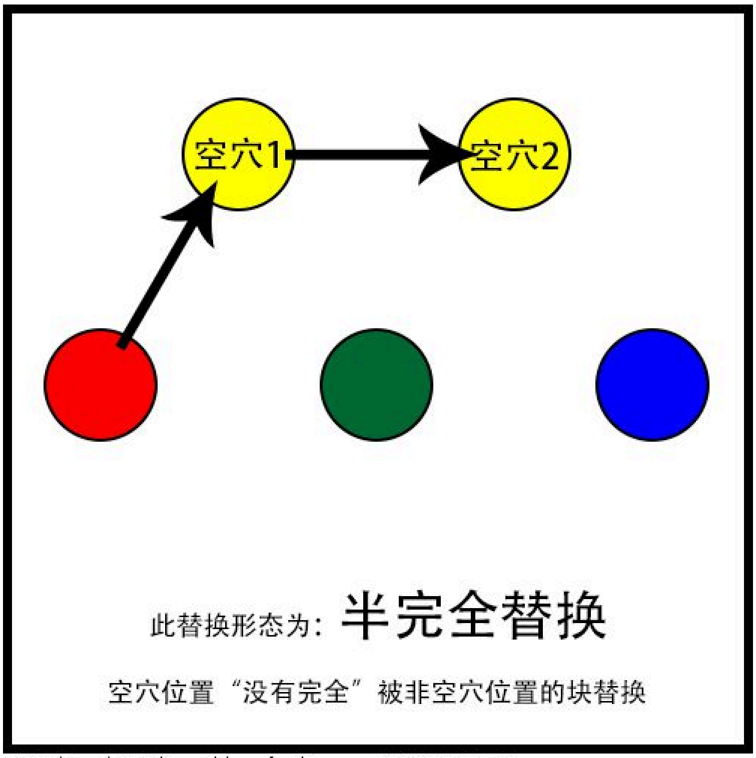
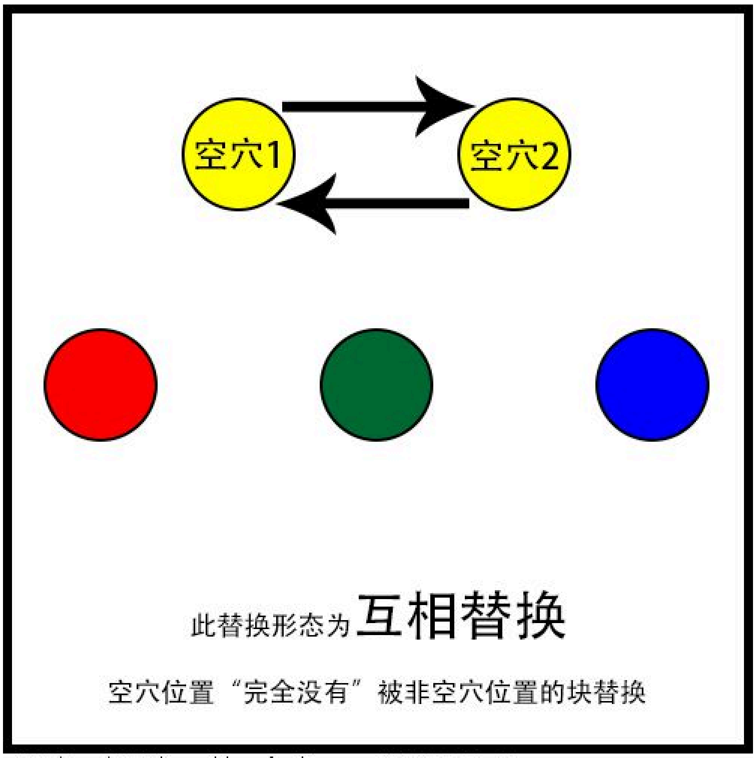


Then the following three blocks, red, green, and blue, are the three blocks at non-hole positions. At this time, the five cyclic blocks of the switch can be exchanged in the following three ways:







Assuming that UF and UB are empty positions, steps such as RU, U, and M2 are all "complete replacement" (the empty position is replaced by a block on another non-empty position); steps such as M, M', and RUR'U are "semi-complete replacement" (one block is replaced from one empty position to another); and steps such as U2 and U'2 are "mutual replacement" (the blocks on the two holes are replaced with each other).

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Tianfangmo Posted on 2017-7-2 20:08:43 | View only this author #4

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Here we would like to explain that this different way of exchanging hole positions is only available in the "multi-hole switch", while the three cycles of the "single-hole switch" will not have this situation, because there is only one hole and

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only two non-hole positions, and no matter which of the two holes are exchanged, the effect will be the same.

Here is an interesting question for you. If the five numbers ①, ②, ③, ④, and ⑤ are combined in pairs, for example: ①②; ②①; ①④, etc., how many combinations are there in total? For example, if positions ②③ are empty, then if so many combinations are exchanged to the empty positions, what are the number combinations for the three replacement states of "complete replacement", "semi-complete replacement", and "mutual replacement"?

Friends who are interested in [Five Cycles] can add my QQ group: 566973854 for detailed discussion.

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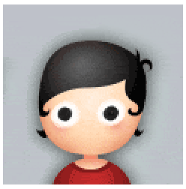

Blue Devil

integral 271

Posts 372

Essence 3

UID 1329680

gender male

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integral 152

Posts 142

Essence 0

UID 1333329

gender male

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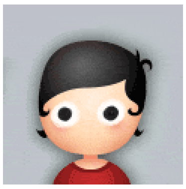

Silver Devil

integral 2632

Posts 1305

Essence 8

UID 4456

gender male

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Yesterday I thought Fen Shen would continue to post, so I didn't rush to post.

The theoretical research on the five cycles is very interesting. Thinking about these contents can deepen my understanding of commutators. Continue to study Fen Shen's masterpiece seriously.

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zhang2345

Yellow Devil

integral 847

Posts 578

Essence 2

UID 1347349

gender male

Hobbies Cracking

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For profound and awesome theories, print them out first and then study them slowly.

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Three Blind Laymen

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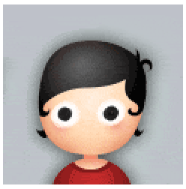
Great post, China's fifth cycle milestone



White Devil

integral 60
Posts 55
Essence 0
UID 1354597
gender Confidential
Place of Xiamen
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