Computer analysis of the two versions of Byzantine chess

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Abstract

Byzantine chess is the variant of chess played on the circular board. In the Byzantine Empire of 11-15 CE it was known in two versions: the regular and the symmetric version. The difference between them: in the latter version the white queen is placed on dark square. However, the computer analysis reveals the effect of this 'perturbation' as well as the basis of the best winning strategy in both versions.

1 Introduction

Byzantine chess [1], invented about 1000 year ago, is one of the most interesting variations of the original chess game Shatranj. It was very popular in Byzantium since 10 CE A.D. (and possible created there). Princess Anna Comnena [2] tells that the emperor Alexius Comnenus played 'Zatrikion' - so Byzantine scholars called this game. Now it is known under the name of Byzantine chess.
Zatrikion or Byzantine chess is the first known attempt to play on the circular board instead of rectangular. The board is made up of four concentric rings with 16 squares (spaces) per ring giving a total of 64 - the same as in the standard 8x8 chessboard. It also contains the same pieces as its parent game - most of the pieces having almost the same moves. In other words divide the normal chessboard in two halves and make a closed round strip [1].

2 Analysis

It is convenient to imagine it in the form of rectangular diagram [3], so that.

\[
\begin{array}{cccc}
P & Q & K & P \\
P & B & B & P \\
P & N & N & P \\
P & R & R & P \\
p & k & q & p \\
p & b & b & p \\
p & n & n & p \\
p & r & r & p \\
\end{array}
\]

(1)

This was obtained from the standard 8x8 board separated into two halves: the first including the Queen-side and the second including the King-side. Then, the two halves are glued at their short edges and a circular strip is obtained: the width of 4 cells and the perimeter of 16 cells. In fact, it is no more than 4 circular roads of the old Hippodrome of Constantinople, since, according to the Roman tradition, the races were competed between the four teams: albati (white), russati (red), prasinati (green) and veneti (blue).

Now in the Byzantine chess the pieces move as they do in Shatranj - the most ancient chess variant. Namely, KINGS, ROOKS, KNIGHTS obey the standard orthodox FIDE chess rules, but BISHOPS jump two square diagonally (resemblance with KNIGHTS), QUEENS move one diagonal, PAWNS have no double first step, nor en passant, neither they are promoted. PAWNS can move clockwise and counterclockwise so that two pawns of a player going in different directions may meet on opposing squares, thus blocking each other (however, the late Byzantines used to treated it as self-annihilation, and the player would immediately loose both pawns, without counting a move).

The win is achieved by mating the opponent, by stalemating the opponent, or by 'bare KING': taking the last piece of the losing side. In the latter case, the game may reduce to a draw if the losing side, in turn, manages to capture the last piece of the opponent and, hence, nothing remaining but the two bare KINGS. However, mating is not a trivial task because QUEENS and
Bishops are very weak and their relative value is equivalent to 1.5 pawn (while it is 10 and 3.5 in orthodox FIDE chess).

Circular chess is a modern game, derived from the original Byzantine chess. It is played on the circular board with the same notation and the same initial setup, but the pieces obey the standard FIDE rules (instead of the Shatranj rules). Indeed, the FIDE rules are known to the widest community and the game of Circular chess has become popular for the last decade and now it will celebrate the 12th World Championship. This game involves complicated combinations and analysis although its modern version was never played in historic Byzantium or Bulgaria of 11-15 CE.

A historic alternative to the regular Byzantine chess is its symmetric version.

\[
\begin{array}{cccc}
P & K & Q & P \\
P & B & B & P \\
P & N & N & P \\
P & R & R & P \\
\end{array} \quad \begin{array}{cccc}
p & k & q & p \\
p & b & b & p \\
p & n & n & p \\
p & r & r & p \\
\end{array}
\]

The initial positions of the white KING and QUEEN are replaced so that the white KING stands on the light square while the white QUEEN stands on the dark square: Such replacement results to the clash between the QUEENS. (Each QUEEN steps one cell diagonally on the squares of its proper color - as a BISHOP of orthodox FIDE chess). Now both QUEENS of symmetric Byzantine chess pass the same set of squares and, hence, may capture each other.

This symmetric version of Byzantine chess should lead to the change in the game tactics and strategy. The Queens can encounter (in orthodox FIDE chess, the endings with similar Bishops are rarely resulting to draw). Will it imply complication and sharpness of symmetric version? It can be revealed only in the direct play.

The online Java applets allows to perform the instant analysis. We have launched one hundred Computer-vs-Computer games for each variant.

In the regular version White won 17 games, lost 13 games, draw was recorded in 70 games.

In the symmetric version the competition yielded the result: +26=61-13.

As an alternative method we used the PC program 'Byzantine Chess' based on Zillions of Games platform. We launched 20 games in Computer-vs-Computer competition with 20 sec time control per move.
In the regular version White won 5 times, lost 4 times, draw was recorded in 11 games.

In the symmetric version the competition yielded the result: +5=12-3.

In fact, to demonstrate the smoothness of the Byzantine chess with respect to the Circular chess, we launched the latter \[\text{II}\] in a 100-game Computer-vs-Computer match, that scored as +42=34-24 (of course White won).

### 3 Conclusion

According to computer analysis, the symmetric version of Byzantine chess \[\text{I}\] reveals a bit less 'peaceful policy' with respect to the regular version \[\text{II}\]. We could recognize the similarity with the BISHOP-VS-BISHOP endgames of orthodox FIDE chess \[\text{III}\]. Namely, the endings with dark-vs-light pieces usually admit 'peaceful' coexistence, but dark-vs-dark and light-vs-light pieces cannot live without a 'war'. In fact, the latter case corresponds to the symmetric version of Byzantine chess.

We have also compared the Byzantine chess and Circular chess (played on the same round board but according to the FIDE rules), and discovered that in the latter variant draws occur approximately two times less frequent (1/3 and 2/3 of all games, respectively). Large number of draws is not strange for the Byzantine chess. There is no PAWN promotion and many endgames are played up to the stage of a bare KING (the condition of loss). The game tends to draw when the major pieces (ROOK and often KNIGHT) are removed off the board - the remaining PAWNS, BISHOPS and QUEENS bring no tension in spite of possible extra piece belonging to the opponent. Moreover, KNIGHT-VS-BISHOP and KNIGHT-VS-QUEEN endgames do not promise any chance to win, for BISHOP and QUEEN can provide perpetual survival against the stronger piece. However, a small deviation from equilibrium in PAWN-VS-PAWN endgame \[\text{I2}\] often results to drastic circumstances. As for mating, it is possible only in the opening or, at least, in the middlegame, especially, if there is some difference between the skill of the players. Computer-vs-Computer program has considered this situation only 3 times in 200 games, although a serious player will mate any existing online- or, offline-program: the Elo rating of the Byzantine chess engines is still lower the FIDE master (FM) level.

Much more strange that White has advantage over Black. It is absolutely
evident in the symmetric version of Byzantine Chess. Have we discovered the specific effect resulted from the QUEENS belonging to the same color (e.g. both move on the dark squares)? We cannot explain this strange fact, perhaps it is due to the peculiarity of the chess engine, while human player may never encounter this effect.

Anyhow, the best game strategy is now outlined: achieve advantage in the middlegame, exchange all minor pieces (BISHOP, QUEEN) and reduce to PAWNS and major pieces (ROOK, KNIGHT) in the endgame. Otherwise, there would be no use of one or two extra minor pieces. On the other hand, it is possible to avoid the evident loss by exchange of all major pieces and PAWNS, thus, reducing to the only minor pieces (but not PAWNS instead!).

4 Perspective

If we compare Byzantine chess with Circular chess, - that is a Byzantine-FIDE hybrid of usual chess played on the circular board - we see that the Byzantine chess is a quiet game with plain development and absence of complicated combinations (perhaps pertaining to the style of live and mind of the late Byzantine scholars and noblemen) - no wonder that stalemate and bare KING are defined as loss. Mating the opponent’s KING is so brilliant event that we believe it should be rewarded 1.5 points (instead of standard 1 point).

Another note concerning the rule of draw: many endings are deprived of real possibility to win and it is reasonable to stop the game if there is no capture, say, within 20 moves. The evident draw endgames (BISHOP-vs-QUEEN, 2BISHOPS-vs-BISHOP&QUEEN etc.) should be also stopped without further play.

In spite of the prosperous development of Circular chess in the last decade, the native original Byzantine chess is played sporadically. The organization of regular tournaments is still under discussion, and it is important to regulate the rules. What we cannot know is the exact scores of Byzantine chessmasters but we can discover and restore the theory of game.
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