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ACOUSTICAL ISSUES IN THE DUTOR INSTRUMENT

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Annotatsiya: *Maqolada dutor cholg'usining akustik xususiyatlari o'rganiladi. Dutorning ovoz hosil qilish mexanizmi, rezonator qutisining roli, torlarning materiali va tarangligi kabi omillar akustik sifatga qanday ta'sir qilishi tahlil qilinadi.*

Kalit so'zlar: *dutor, akustika, rezonator, torlar, tovush hosil bo'lishi, material, taranglik, sozlash, akustik sifat, rezonans, musiqiy tembr, zamonaviy tadqiqotlar, musiqa ilmi, torli cholg'u, ovoz kuchaytirish.*

Abstract*: This article explores the acoustic properties of the dutar instrument. It analyzes how factors such as the sound production mechanism, the role of the resonator box, the material of the strings, and their tension affect the acoustic quality of the instrument.*

Key words: *dutar, acoustics, resonator, strings, sound production, material, tension, tuning, acoustic quality, resonance, musical timbre, modern research, stringed instrument, sound enhancement.*

INTRODUCTION

The dutor is an ancient stringed instrument of the peoples of Central Asia, whose sound is formed by the vibration of the strings and the resonator box. This article will cover in detail the acoustic aspects of the dutor, the principles of its sound production and methods for improving its quality.

1. Sound production mechanism

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The dutor is a stringed instrument, whose sound is produced by the vibration of the strings. When the strings vibrate, waves are created in the air, which are amplified by the resonator box.

2. The role of the resonator box. The body of the dutor (resonator box) performs the function of amplifying and directing sound waves. Its shape and material have a great influence on the timbre and pitch of the sound. Dutors made of walnut or mulberry wood often have a strong and rich timbre of sound

3. The material and tension of the strings. In the dutor, the strings are made of silk, metal or artificial materials. While metal strings produce a bright, resonant sound, silk strings produce a softer, deeper sound. As tension increases, the pitch and frequency of the sound also increase.

4. Factors affecting acoustic properties. The material of the instrument - the material of the resonator box and the strings - affects the richness and timbre of the sound.

The method of sound production - plucking the strings with the fingers or striking them with a mediator - determines the variety of sound. Dryness and age of the wood - dutors made of old, well-dried wood have better resonance. As a result, the acoustic quality of the dutor depends on its construction, materials used, and playing style. Therefore, a scientific approach is of great importance in making and tuning a dutor, along with traditional knowledge.

DISCUSSION AND RESULTS

Improving acoustic quality: The following methods are used to improve the acoustic quality of a dutor:

Optimizing the resonator: Correctly adjusting the cavities and shape inside the resonator increases the sound quality.

Adjusting the strings: By correctly adjusting the length and tension of the strings, the pitch and timbre of the sound can be improved.

Use of Materials: Using quality materials, especially the material of the resonator and strings, improves the overall sound of the dutor. Material Selection The material used has a huge impact on the acoustic properties of the dutor.

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Resonator material – the most commonly used materials are mulberry, walnut, spruce and maple, each with its own acoustic properties.

String material – while traditional dutors used silk or gauze strings, modern versions use metal or synthetic strings. Metal strings produce a loud and powerful sound, silk strings create a soft and mellow timbre.

1. Resonator shape and size. The resonator box affects the sound range and power of the dutor.

2. A large resonator – makes the sound deeper and richer. A small resonator – makes the sound louder and brighter. Shape – if the inside of the resonator is smooth, the sound will be clearer.

3. String tension and length. Long strings – the sound will be lower and deeper. Short strings – the sound will be higher and brighter.

Tightly tensioned strings – produce a loud sound, but vibrate less.

Looser strings - the sound will be deeper and richer, but the pitch will be lower.

Methods for improving the sound quality of the dutor

There are several methods for improving the acoustic quality of the dutor:

1. Choosing the right material. Drying the wood - if the resonator wood is sufficiently dried, the sound quality will increase. Using high-quality strings - pay attention to the quality of silk or metal strings.

2. Adjusting the resonator and strings. Correctly placing the resonance points inside the resonator - this will help to spread the sound better. Proper tension of the strings - too loose or too tight can negatively affect the sound quality.

3. Correctly applying the playing technique. Finger tapping - creates a soft and natural tone. Using a mediator - produces a louder and clearer sound. Controlling the force of tapping - clicking too hard can distort the resonance. Acoustic research and modern approaches

Currently, scientific research into the acoustic properties of the dutor is ongoing. Some researchers are trying to find ways to improve the acoustic capabilities of the dutor by modeling the sound waves inside the resonator. In addition, innovations such as the use of new materials, the addition of sound amplifiers, and the improvement

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of the quality of the strings are being observed in modern dutors. As a result, the acoustic quality of the dutor depends on its construction, the materials used, and the playing style. Therefore, a scientific approach is of great importance in the construction and tuning of the dutor, along with traditional knowledge.

CONCLUSION

The acoustics of a dutor depend on its structure, materials, and playing methods. To create a dutor with good acoustic quality, it is necessary to correctly select the materials, shape, and tension of the resonator and strings. Improving acoustic quality also depends on the performance technique, which ensures the clarity and richness of the sound.

Currently, scientific study of the acoustic properties of the dutor continues.

Some researchers are trying to find ways to improve its acoustic capabilities by modeling the sound waves inside the resonator.

In addition, innovations such as the use of new materials, the addition of sound amplifiers, and the improvement of the quality of the strings are observed in modern dutors.

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