

## THE ULAMA OF HIP PREHISPANIC BALL GAME, A THREE-DIMENSIONAL STUDY

Matilde Espinosa-Sánchez

Unidad de Investigación en Cómputo Aplicado, DGSCA.  
Universidad Nacional Autónoma de México, México

**KEY WORDS:** ball game, ulama, strike with hip

**INTRODUCTION:** The game of ulama has been practiced till the pre-Hispanic time, from Brazil, to Arizona and the Antilles. The balls to play ulama were made of rubber and weighed up to 4 kg. At the present time the hip modality is practiced in the North region of Mexico. It is a game between two teams. The players strike the ball with the hip directing it to the field of the opposite team, like in volley ball but without a net.

The main objectives of this work was to know the present game technique and the kinematics of the movements.

**METHOD:** A player of ulama was recorded simultaneously with two video cameras at 60 Hz. The movements were reconstructed to 3D using the DTL procedure. The human body was represented in 14 corporal segments. The data were interpolated and smoothed with cubic beta-splines, and cleaned with a low pass filter.

Each technical element (Espinosa, 2005) is analyzed (Hay, 1985). The angular displacement and velocity of the corporal segments has been calculated.

**RESULTS:** In the three technical elements (Table 1) the amplitude of the general ROM is greater in the phase of preparation. The technical element of greater ROM is the one when the ball is struck at the ground level.

Table 1. Technical elements of hip ulama.

Technical element	Time [s]	Phase of preparation	Main phase	Phase of recovery
Strike at the ground level	2.48	0.72	0.20	1.56
Strike with the feet on the ground	2.22	1.31	0.39	0.52
Strike with a jump	1.86	0.63	0.36	0.87

**DISCUSSION:** The 3D kinematic analysis presents more accurately the execution of the technique body movements.

**CONCLUSION:** The process to know this activity motivates to promote the practice of this sport.

### REFERENCES:

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