ANALYSIS OF THE FENCING LUNGE FLIGHT PHASE IN EPEE
Enrique Lopez¹, Francisco Saucedo¹, Enrique Navarro¹, Oscar Martínez de Quel², Raquel de Antonio¹
(Universidad Politécnica de Madrid (UPM)¹, Universidad Complutense de Madrid², Spain)

INTRODUCTION
The different study areas in sports, in this case biomechanics, allow test the rationality of technics in combat sports. Fencing is one of the most ancient physical activities, but if we compare it with other sports, has been slightly studied in a scientific way.

We have centred our work on the displacements, and more concretly on the fencing lunge (developpement) that is one of the most ancient and whose invention date was 1575. Some of the most relevant authors in fencing as Clery (1965), Szabó (1977) and Arkayev (1980), affirm lunge is correctly executed when the point of the weapon reach target before the front foot land on the floor.

In this investigation we will try to demonstrate if this form of execution has some mechanical justification.

METHODS.
Fourteen fencing lunges performed by the best spanish epeeists, were analyzed in competition conditions. Were filmed by two video cameras in order to realize a three dimensional analysis. Lunges were chosen at random. The sampling rate were 50 Hz and the images were digitized using a twenty one points model proposed by Clauser (1969). Two extra points were added in order to represent the weapon.

The three dimensions coordinates of each one of twenty three points of the model were calculated using the BIOMEC program designed by Navarro(2000), using the DLT (Direct Linear Transformation) developed by Abdel – Aziz and Karara (1971). Also there were calculated the coordinates of the model’s Mass Center.

RESULTS
Results show that in all cases the weapon’s maximum speed in the movement direction was reached before the front foot land on the soil, being the average value 4,019 m/s and 1,488 the standard deviation.

DISCUSSION
Our results, in competition conditions, coincide with found in Klinger and Adrian (1983) that they were fulfilled in laboratory and with another analysis methodology.

CONCLUSIONS.
None of the fencing authors checked justifies the reason to reach the target with the weapon’s point before the front foot land on the soil, but with this investigation we can explain at least there is a mechanical reason, since the maximum speed of the weapon is obtained always during the flight phase of the lunge.

REFERENCES
Keywords: 3D Analysis, Fencing, Biomechanics