

Numerical Simulation of a Human Body Subjected to Electrostatic Fields for Study of the Turin Shroud Body Image

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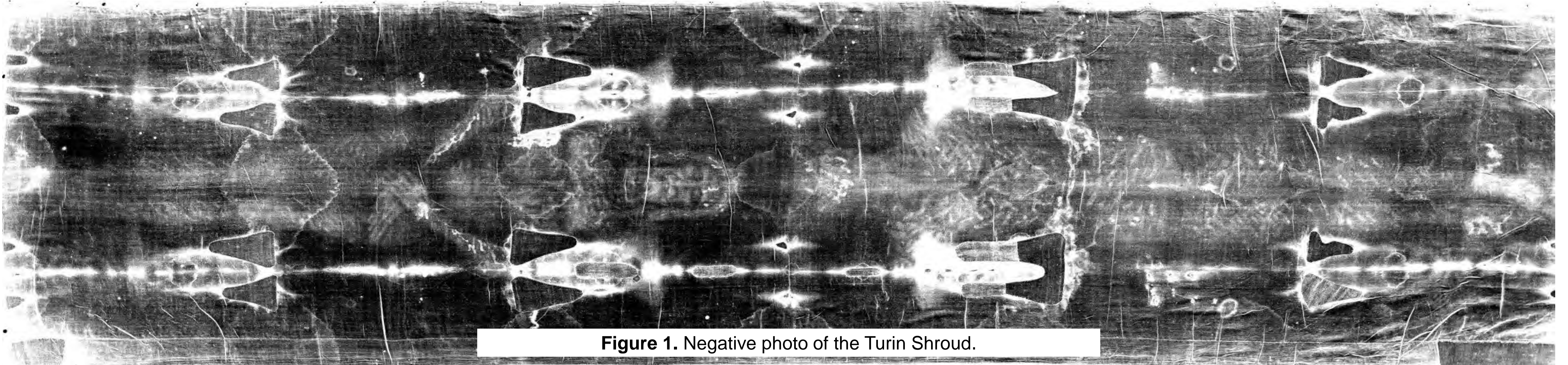


Figure 1. Negative photo of the Turin Shroud.

INTRODUCTION

The Turin Shroud (TS), see Figure 1, shows a very particular image not yet explained by science. The best hypothesis to explain it is based on Corona Discharge generated by a local intensification, due to a complex mechanism currently under examination, of a background electric field.

Experimental studies have shown that a Corona Discharge can produce an image on a linen fabric whose intensity is proportional to the electric field acting on it. Using a numerical manikin with

COMSOL[®] software, this study is addressed to show the best environmental condition able to reproduce the light and dark tones of the TS image.

NUMERICAL MODEL

The model (Figure 2) is characterized by 176295 degrees of freedom and 46 elements: 26 ellipsoids, 12 cylinders, 4 cones, 2 rectangles and 2 balls. A parallelepiped enclosing the manikin was built to simulate the environment filled with air (Figure 3).

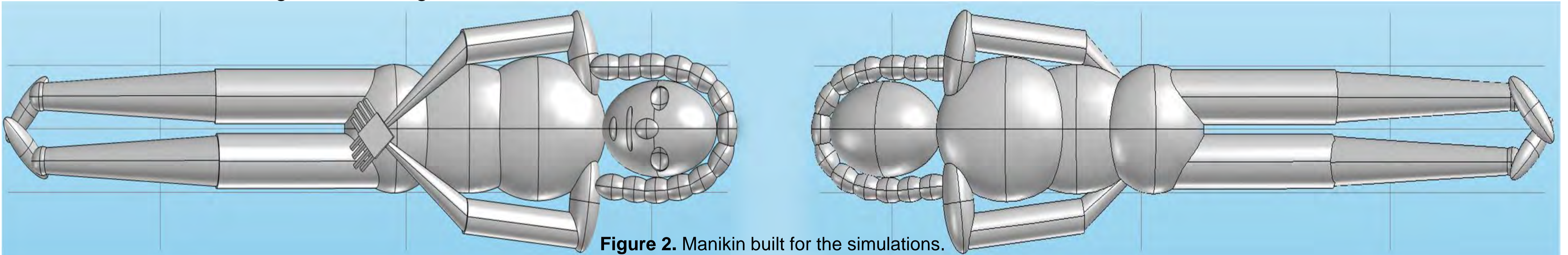


Figure 2. Manikin built for the simulations.

RESULTS

Five different environmental conditions have been simulated, see Figure 3 and Table 1. Case 1 represents a manikin floating in the parallelepiped having the upper plate at a potential of 1 V (the lower plate is grounded). Figure 4 shows the resulting electric field distribution on an ideal surface, positioned at a certain distance from the manikin in some areas, and in contact in correspondence of others, to simulate the TS wrapping around the human body. The analogy with the intensity distribution of the TS body image is evident.

CONCLUDING REMARKS

From the five cases studied, the best match with the TS image seems reached by Case 1 of Figure 4 that simulates a manikin floating in an electric field referred to the geometrical and electrical scaled model. Thanks to the linearity of the problem (for dimensions greater than some centimeters), to obtain a real condition, the geometrical model must be enlarged by a factor of six and the applied potential must be increased by a factor of about 100000.

This result supports the Corona Discharge hypothesis and helps in the study of the environmental conditions that caused the TS image. Also after the recent rebuttal of the 1988 radiocarbon results, the authors are convinced that the TS really wrapped the body of Jesus of Nazareth and therefore they are studying which kind of environment could have generated the TS body image.

In the hypothesis suggested by the Gospels that the corpse of Jesus was buried in a sepulcher excavated in the rock of Jerusalem, and externally closed by a big stone, we can formulate two initial hypotheses to explain the vertical electrostatic field suggested.

The second one, makes reference to an electric field generated in the sepulcher by a not yet well defined cause that could also be a (ball) lightning or the spillage of radon gas accentuated by the concomitance of a big earthquake, also mentioned in the Gospels. The radon gas would have ionized the environmental air generating an electric field.

Based on the numerical results here obtained, future experiments, are just addressed to reproduce an electrostatic image on a linen fabric that will be as much as possible similar to that of the TS in the environmental conditions of Case 1. These results will hopefully help in a definition of the environment that produced the TS body image.

For more details please read the corresponding paper.

Table 1. Summary of the five simulations performed.

Case	Figure	Manikin	Upper Wall	Lower Wall	Right Wall	Three Lateral Walls	Additional Plate
1	3-4	Floating	1V	Ground	Zero Charge	Zero Charge	-
2	5	Ground	1V	Zero Charge	Zero Charge	Zero Charge	-
3	6	Floating	Zero Charge	Zero Charge	1V	Zero Charge	Ground
4	7	Floating	Zero Charge	Ground	Zero Charge	Zero Charge	1V
5	8	Floating	Ground	Ground	Zero Charge	Zero Charge	1V

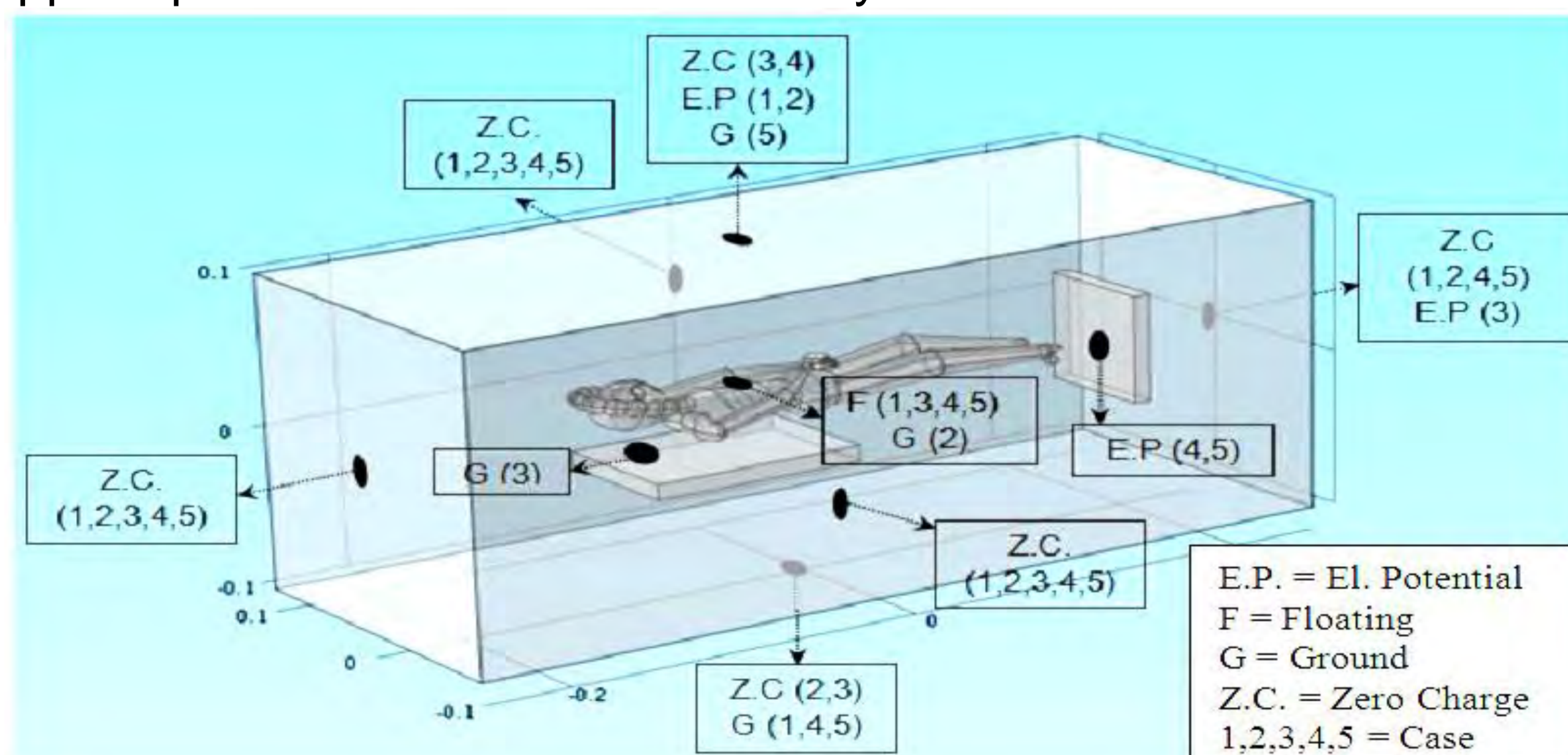


Figure 3. Summary scheme of the five simulations performed.

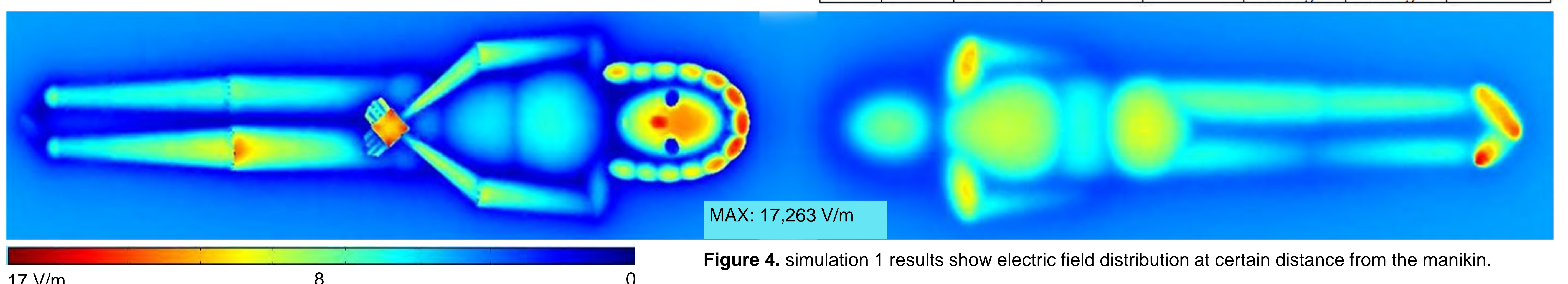


Figure 4. simulation 1 results show electric field distribution at certain distance from the manikin.