# SYSTEM FOR SIMULTANEOUSLY THERAPY BY RUNNING LOW FREQUENCY MAGNETIC FIELD AND ACUPRESSURE

***Dimiter Tz. Dimitrov, Sasho Guergov***

**Technical University of Sofia, Bulgaria*
*1000 Sofia, "Kl. Ohridsky" str. 8*
*Tel. (+359 2) 965-2278;e-mail:dcd@tu-sofia.bg*

***Abstract***

*An simultaneously application of low frequency magnetic field and acupressure is described in the paper. A visualisation of space configuration of low frequency static magnetic field is done in the paper, also. A design of system for acupressure is done together with mathematical description of action of mechanical device for acupressure. The requirements for design of system for therapy with low frequency magnetic field and acupressure is presented. Some mechanical solutions for system for acupressure are described In the paper, also.*

## 1. Introduction

The results of therapy by acupressure would be more good if there would be provided more intensive movement of the blood in around the points of acupressure. This activation of blood's movement can be provided by application of low frequency magnetic field together with acupressure.

The application of China's method for acupressure is very actual in medical therapy, now. Usually physician provide application of acupressure by his hands. It's inconvenient first of all for physician. He's able to work for short time. Then he can continue after relax, but the number of these procedures per day are limited. In other side it would be better to provide acupressure simultaneously on more points on the human body. It's impossible because physician has only two hands.

It's clear that it' s necessary to provide special device for acupressure, which can be used together with special device for creating of low frequency magnetic filed around the points for acupressure. Therefore the application of system for simultaneously application of acupressure and low frequency magnetic field is very actual, now.

## 2. Design of devices for creating of low frequency magnetic field around the points for acupressure

Usually the low frequency magnetic field can be created using two coils, connected to the output of apparatus for magneto-therapy. This apparatus is a source of special electrical signals for the coils. The space configuration of magnetic field in the patient's area depends to the mutual disposition of local inductors and the value of electrical current in the inductors. Always the inductors are without ferrous core. Therefore the waveform of magnetic induction is the same as the waveform of electrical current in the coils (inductors). Usually the waveform of electrical current in the coils is as rectangular pulses with variable frequency in the frequency band 0,1Hz – 100Hz. It's difficult for the organism to do an adaptation to the parameters of magnetic field because of variable frequency. This provides more good results after magneto therapy. These results can be obtained after short time of application of magnetic field. The magnetic induction in the patient's area should not exceed 10 mT.

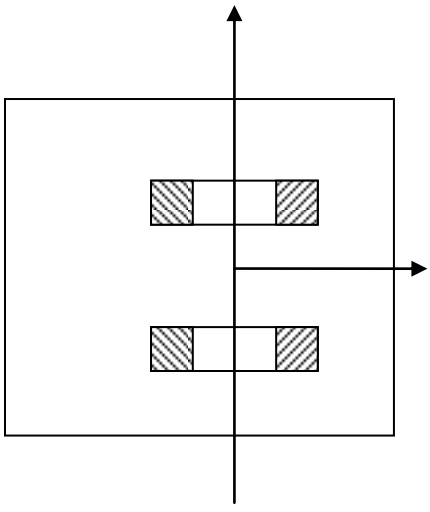

**Fig. 1. Disposition of the two inductors**

The space configuration of magnetic field can be seen on the base of mathematical description of magnetic field and computer simulation. The mutual disposition of the two inductors can be seen on Fig. 1. The space disposition of the lines of vectors of magnetic induction in the points of plane XOZ can be obtained by mathematical description and computer simulation. It can be seen on the Fig. 2.

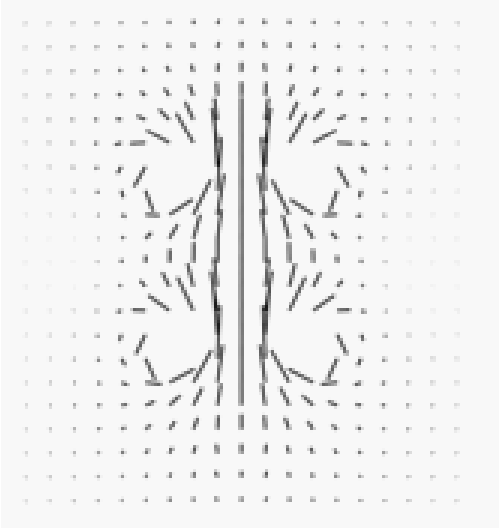

**Fig. 2. Space dispositions of the lines of vectors of magnetic induction in the points of plane XOZ**

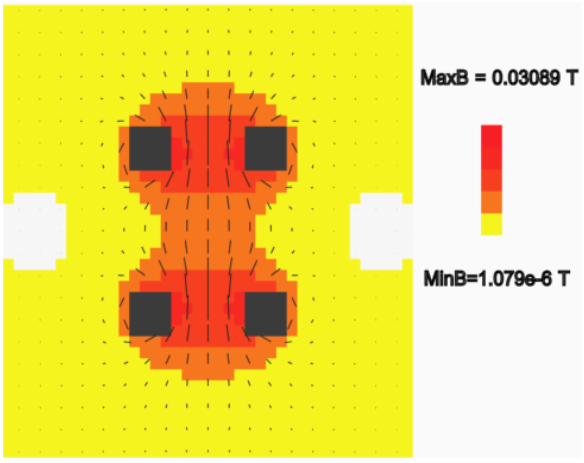


**Fig. 3. Space distribution of the values of magnetic induction in the points of plane XOZ**

The space distribution of the values of magnetic induction in the points of plane XOZ is an other result of computer simulation of space-temporal configuration of low frequency magnetic field in the patient's area. It can be seen on the Fig. 3. The calculation has been done for the value of relative magnetic permeability of alive tissues 1 and value of electrical current in the coils I=2A.

## 3. Design of the bed for therapy by running magnetic field

The method for computer simulation of space configuration of low frequency magnetic field of pair coils can be used for computer simulation of space configuration of magnetic field in the case of running magnetic field, also. In this case the coils can be as one or two sequences on the bed Fig. 2.

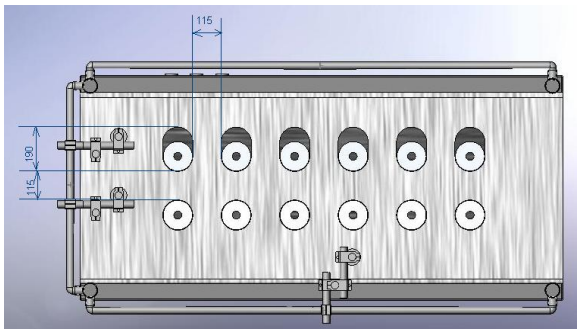


**Fig. 4. The disposition of coils on the bed in the case of running magnetic field**

The materials of the bed should be non magnetic. An appropriate plastic can be used. This plastic should has enough mechanical strong. This materials should has high mechanical hardness, high chemical steady, high steady for wear out, good skid, high electrical steady, good absorption of hits.

The patients should be recumbent on the coil's sequence on the bed. The mutual disposition of two sequence coils and patient's body can be seen on fig. 5.

On the patient's body should be two or more mobile coils depend of the number of coil's sequences. The coils on the bed should be on when they are under mobile coils.

The "movement" of low frequency magnetic field can be obtained by electronic switching over of the coils on the bed together with electronic switching over of several coils situated on special rolling stand on the human body. The apparatus for magnetotherapy, which provides the signals for coils can be seen on fig. 7. The space distribution of magnetic induction's value of running magnetic field (fig. 6) has been done for different position of "mobile" coils.

The apparatus for magnetotherapy, which provides the signals for coils can be seen on fig. 7. This apparatus can provide measurement of the value magnetic induction in different points around the

human body, using special drill for low frequency magnetic field.

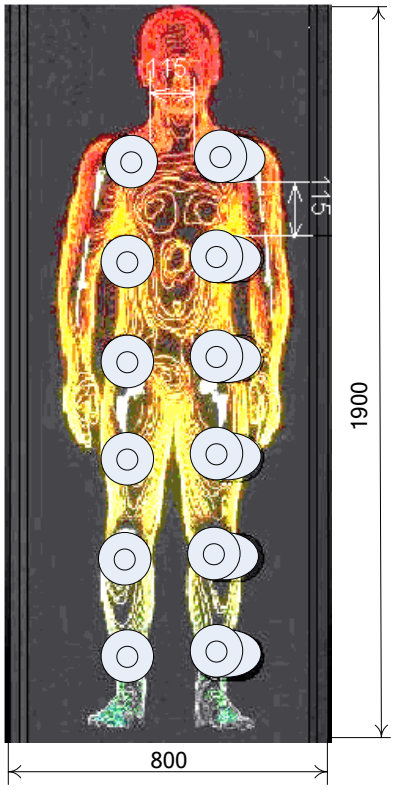


**Fig. 5. Mutual disposition of two sequence coils and patient's body**

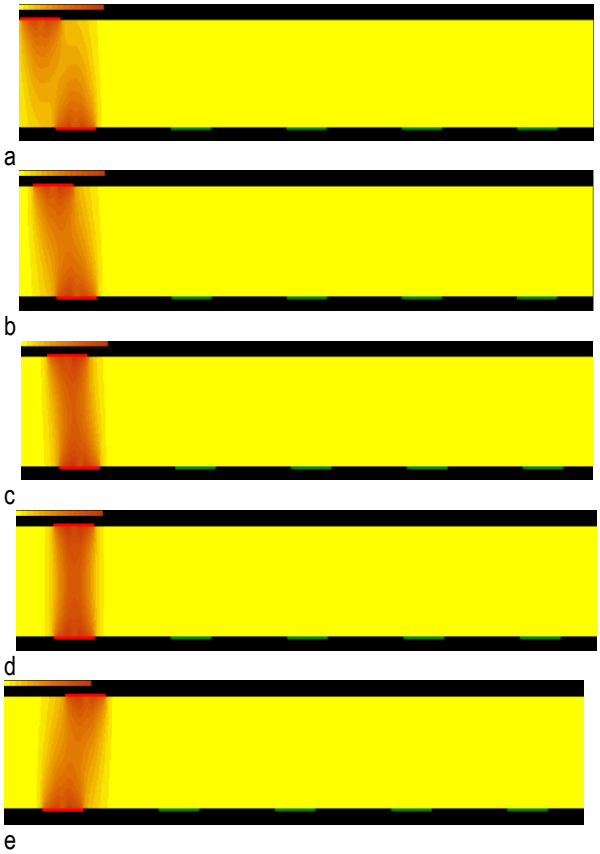


**Fig. 6. Space distribution of magnetic induction's value of running magnetic field**

**Fig. 7. Apparatus for magneto-therapy**

## 4. Design of mechanical device for acupressure

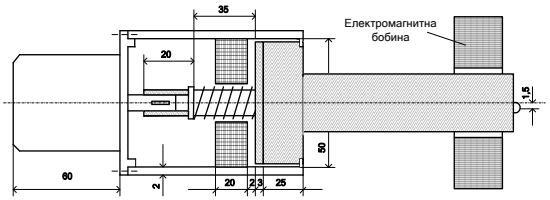


**Fig. 6. The modified device for acupressure simultaneously with low frequency magnetic field**

Usually the line of mechanical pressure is the axis of coils. The sizes of coils can be different according to the sizes of "active" area around of the acupuncture points. On fig. 6 can be seen a mechanical device for acupressure. For simultaneously application of low frequency magnetic field and mechanical acupressure, the line of mechanical pressure should be the same as the line of coil.

## 3. Conclusion

1. A bed for simultaneously therapy by running magnetic field and acupressure has been suggested in the paper.

2. A computer simulation of space distribution of magnetic induction' values of pair coils depending of the value of electrical current around the points of acupuncture in different cases of disposition of coils on the human body has been done in the paper.

3. A mechanical construction of device for simultaneously acupressure with low frequency magnetic field (Fig. 6) have been done, also.

## References

[1] D. Tz. Dimitrov, Computer Simulation of Space Configuration of Low Frequency Magnetic Field in Magnetotherapy, p.28-32, Electronics and Electrical Engineering, ISSN 1392-9631, 2005, -No.3 (59).

[2] Д. Ц. Димитров, Изследване на пространствената конфигурация на нискочестотно магнитно поле в магнитотерапията. стр. 38-43. "Електроника и Електротехника", No. 9-10, 2005.

[3] D. Dimitrov, A. Dimitrov, Computer Simulation of Low Frequency Magnetic Field, p.171-175, Proceedings of 17th EAEEIE Annual Conference on Innovation in Education for Electrical and Information Engineering, June, 1-3, 2006, University of Craiova, Romania.

[4] Хилебрехт, М. Акупресура, ISBN9548793253, Емас, 1998, с. 240.

[5] Хилебрехт, М. Акупресура – път към добро здраве, Емас, 2000, с.240.