



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكرو فيلم

جامعة عين شمس

التوثيق الالكتروني والميكرو فيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون أية تغيرات



يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %



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بعض الوثائق الأصلية تالفة



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بالرسالة صفحات
لم ترد بالأصل

MRI STUDY OF POROUS MEDIA

By

Eng. Ahmed M. Nasr Moustafa

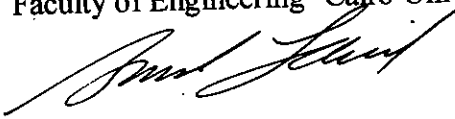
Systems and Biomedical Engineering Department
Faculty of Engineering, Cairo University

A Thesis Submitted to the
Faculty of Engineering, Cairo University
In Partial Fulfillment of the requirements for the degree of
MASTER OF SCIENCE
In
SYSTEMS AND BIOMEDICAL ENGINEERING

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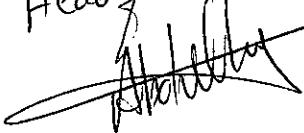
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GIZA, CAIRO

April 2002

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MRI Study of Porous Media

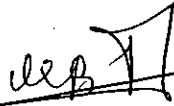
By

Eng. Ahmed Mohamed Nasr Mustafa

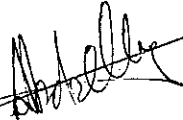
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Abstract:

There is no doubt that Magnetic Resonance Imaging (MRI) is one of the most advanced imaging technologies today. It has experienced a phenomenal growth within the last two decades. The success of MRI applications in the medical field has encouraged researchers to look for new applications in other areas of science. It is for this reason that this study was performed so that MRI can be used to characterize different porous media of preliminary importance to various fields of sciences such as oil exploration, food industry, and medical bone examinations. This research focuses mainly on the ability of MRI to image the internal structure of porous solids by filling their void space with a fluid rich in protons like water. The main idea relied on the relaxation behavior of the protons due to the effect of the surrounding solid.

It was found that porous media behave according to their pore matrix size when it comes to proton relaxation process. A direct relation between the longitudinal relaxation time and pore size range was found. Five parameters were established for classification of porous media according to the relaxation behavior of the fluid filling their void space. It was also shown that MRI techniques have a great potential in studying porous media characteristics especially with the development of new technologies and analysis techniques (such as gamma-ray density and neutron porosity techniques).

Thesis organization:

This thesis consists of five chapters:

Chapter (1): An introduction that mentions the motivation of performing this research along with a general overview of the application of this research to oil field exploration, food industry, and medical bone examination.

Chapter (2): A literature review that portrays a general historical overview of the development of MRI and the principles of MRI theory and parameters. After that, the various components of the MRI machines are listed along with a brief explanation. Then, the basis for the analytical analysis is given. Finally, a summary of previous papers on the subject is given.

Chapter (3): Mentions what materials were used and there advantages. Then, it shows the fabrication of the seven phantoms used to perform the experimental phase of this research. After that, the description of the MRI machine used is given. Finally, the methods used are listed.

Chapter (4): Portrays the results and the discussion of the analysis performed according to the previous chapters.

Chapter (5): Gives the conclusions of the research along with the possibilities of future work.

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I had the opportunity to work with and learn from Prof. Dr. Bassel Tawfik and Dr. Yaser Moustafa who I owe a dept of gratitude for their invaluable advice and assistance that made this work possible.

