



**Sudan University of Science and Technology**  
**College of Graduate Studies**



# **DetermineTheDepth of The Gaps and Cracks in The Concrete Using UltrasonicTesting**

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باستخدام اختبار الموجات فوق الصوتية**

**A thesis submitted for the partial fulfillment of the requirements  
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# الآية

بسم الله الرحمن الرحيم

﴿1﴾ وَوَضَعْنَا عَنْكَ وِزْرَكَ ﴿2﴾ الَّذِي أَنْقَضَ ظَهْرَكَ  
﴿3﴾ وَرَفَعْنَا لَكَ ذِكْرَكَ ﴿4﴾ فَإِنَّ مَعَ الْعُسْرِ يُسْرًا ﴿5﴾ إِنَّ مَعَ الْعُسْرِ يُسْرًا  
﴿6﴾ فَإِذَا فَرَغْتَ فَانصَبْ ﴿7﴾ وَإِلَىٰ رَبِّكَ فَارْغَبْ ﴿8﴾

سورة الشرح

## **Dedication**

I dedicate this work to my beloved mother, dear father, brothers, sisters and all the family.

# Acknowledgment

First of all thanks and praises to Allah for giving me strength and patience to complete this work.

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## **Abstract**

This study discusses the use of ultrasound device to determine the depth of gaps and cracks in concrete, the study included four concrete samples with specifications and known dimensions, two samples were used to perform ultrasound detection of cracks after making artificial incisions with a specific and different depth for each sample, and two samples to detect gaps after placing a rubber ball about 4 cm in diameter inside each sample with known dimensions, ultrasound detection was performed in two direct and indirect ways, In the direct method the device gives the depth reading directly, while in the indirect method the depth cannot be determined unless mathematical calculations were made, the study concluded that the detection by the direct method gives accurate results and recommended than the other methods.

## المستخلص

تناقش هذه الدراسة استخدام جهاز الموجات فوق الصوتية لتحديد عمق الثغرات والشقوق في الخرسانة، وشملت الدراسة أربع عينات من الخرسانة ذات مواصفات وأبعاد معروفة، واستخدمت عينتين لأداء الكشف بالموجات فوق الصوتية للشقوق بعد صنع شقوق اصطناعية ذات عمق محدد ومختلف لكل عينة، واثنين من العينات للكشف عن الفجوات بعد وضع كرة مطاطية قطرها حوالي 4 سم داخل كل عينة بأبعاد معروفة، تم إجراء الكشف بالموجات فوق الصوتية بطريقتين مباشرة وغير مباشرة، في الطريقة المباشرة يعطي الجهاز قراءة مباشرة وفي الطريقة غير المباشرة لا يتم معرفة العمق الا بعد اجراء حسابات رياضية خلصت الدراسة إلى أن الكشف وغير مباشرة بالطريقة المباشرة يعطي نتائج دقيقة و أفضل من الطرائق الأخرى.

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