AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

LOCALLY AVAILABLE NATURAL FIBERS AS ALTERNATIVES FOR SYNTHETIC FIBERS IN CONCRETE AND ENGINEERING APPLIATIONS

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B.Sc., Civil Engineering
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Submitted in partial fulfillment for the requirements of the degree on Master of Science in structural engineering

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AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

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<u>**Thesis Title:**</u>

Locally available natural fibers as alternatives for synthetic fibers in concrete and engineering applications

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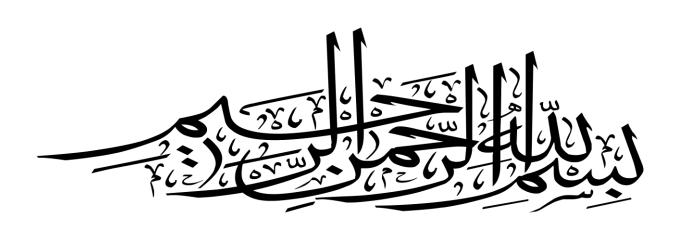
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بسم الله الرحمن الرحيم

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Statement

This dissertation is submitted to Ain Shams University for the degree of Master of Science in structural engineering.

The work included in this thesis was carried out by the author at the structural engineering department, faculty of engineering, Ain Shams University.

No part of this thesis has been submitted for a degree or qualification at other university or institute.

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Abstract of the M.Sc. Thesis

Submitted by

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Title of Thesis:

Locally available natural fibers as alternatives for synthetic fibers in concrete and engineering applications

Supervisors:

Prof. Dr. EL Sayed Abd El Raouf Nasr

Dr. Yehia Abdel Zaher Ali

This research studied the effect of some locally available natural fibers (flax, sisal and jute) on the properties of concrete in a comparison with synthetic fibers.

Four treatment methods were used to choose natural fibers to investigate the effect of treated natural fiber on the properties of concrete mix. These methods are:

1- Hot water treatment

2- Cold water treatment

3- Sodium hydroxide treatment

4- Alcohol water mixtures (40:60)

Physical and mechanical properties of treated and untreated fibers (length, diameter, moisture content, elongation % and strength) were determined.

Eight different concrete mixes were used with different percentages of fibers content (0.0, 0.3, 0.5, 0.7, 0.9, 1.1, 1.3 and 1.5 % by weight of cement). Compressive and flexural strengths were used to evaluate the mixes to choose the optimal fiber content % (1.1 %).

Concrete mixes contain different types of fibers (flax, sisal and jute) were prepared using the optimal fiber content %.

Compressive, flexural and splitting tensile strengths and modulus of elasticity were determined and compared to those of control mix (without fibers) and mix contains glass fibers.

The research also includes the use of natural fibers in untraditional applications such as producing fiber reinforced polymers (FRP) rebars and using of Jute fabrics in the strengthening of concrete elements.

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