Effect of the Fiber Content on the Tensile Strength Properties of Basalt Fiber Reinforced Polymer Rebars

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INTRODUCTION

Corrosion of the steel reinforcement in steel reinforced concrete structures

→ Corrosion cost: $22.6 billion/year (US)

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INTRODUCTION

Alternative to steel → FRP (Fiber Reinforced polymer) rebars**:** Fiber + Resin

Advantages

- No corrosion issues
- Higher tensile strength capacity
- Lower weight (1/4 of steel)
- Transparent to magnetic fields
- Non conductive
- Etc.

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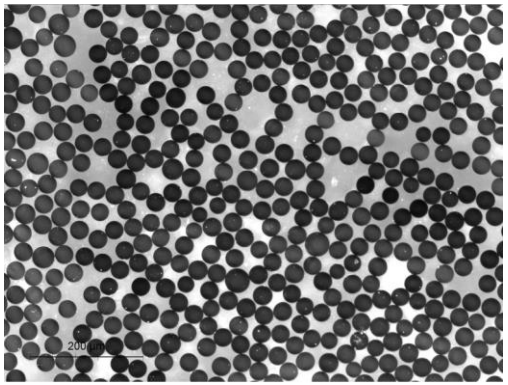
INTRODUCTION

FRP (Fiber Reinforced polymer) rebars

- Fibers: Basalt (BFRP), glass (GFRP), carbon (CFRP), aramid (AFRP)
  → Carry the load

- Resin: Vinyl Ester, Epoxy, Polyester
  → Transfer stresses & protect the fibers



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RESEARCH OBJECTIVES

Correlate the fiber content of BFRP rebars with their tensile test properties:

- Tensile Strength

- Modulus of Elasticity

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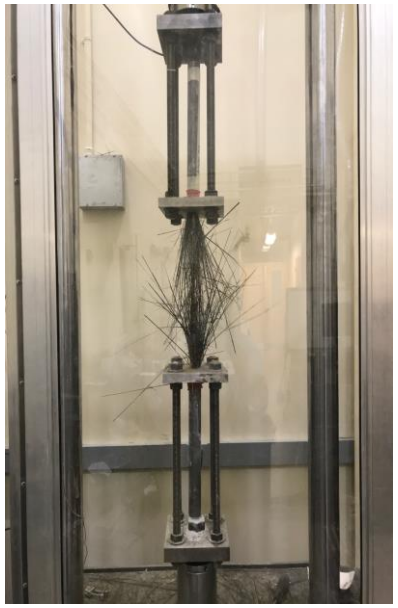
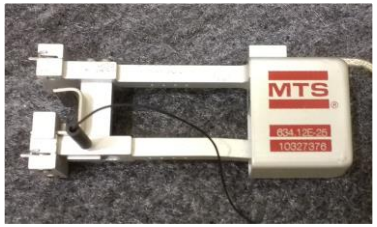
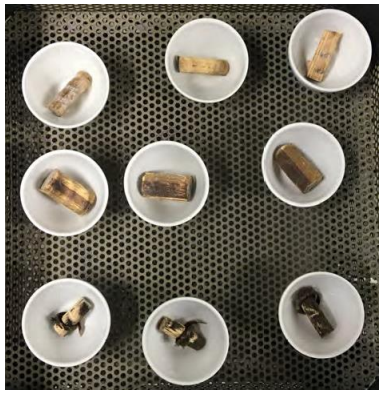
MATERIALS

- Three (3) BFRP rebar manufacturers (A,B & C)

- Two (2) rebar sizes

  - #3 (Ø = 3/8 in, 10 mm): Type A & B
  - #5 (Ø = 5/8 in, 16 mm): Type A & C

METHODOLOGY

Tensile Properties (ASTM D7205)	Fiber Content (ASTM D2584)
  	 

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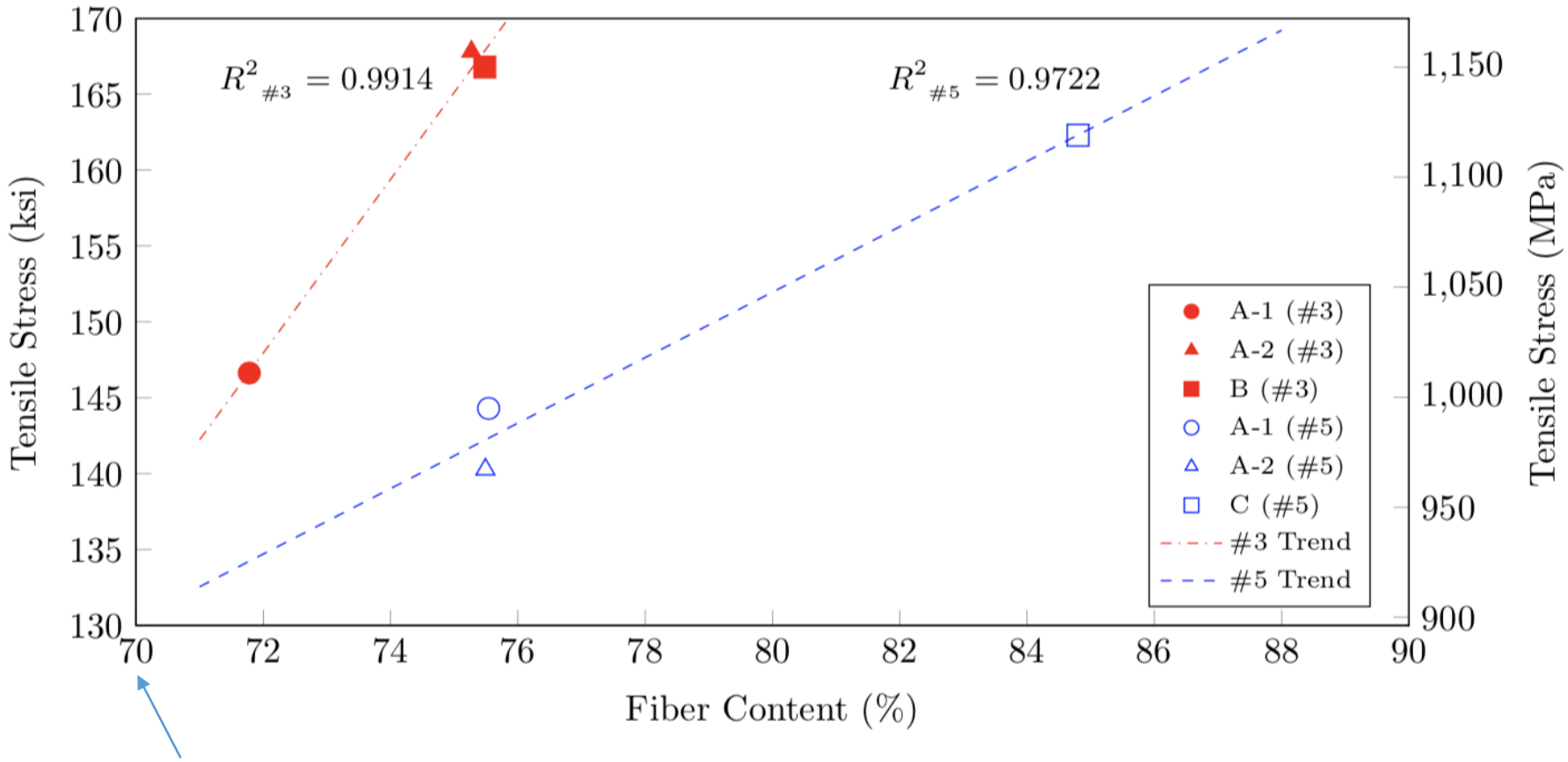
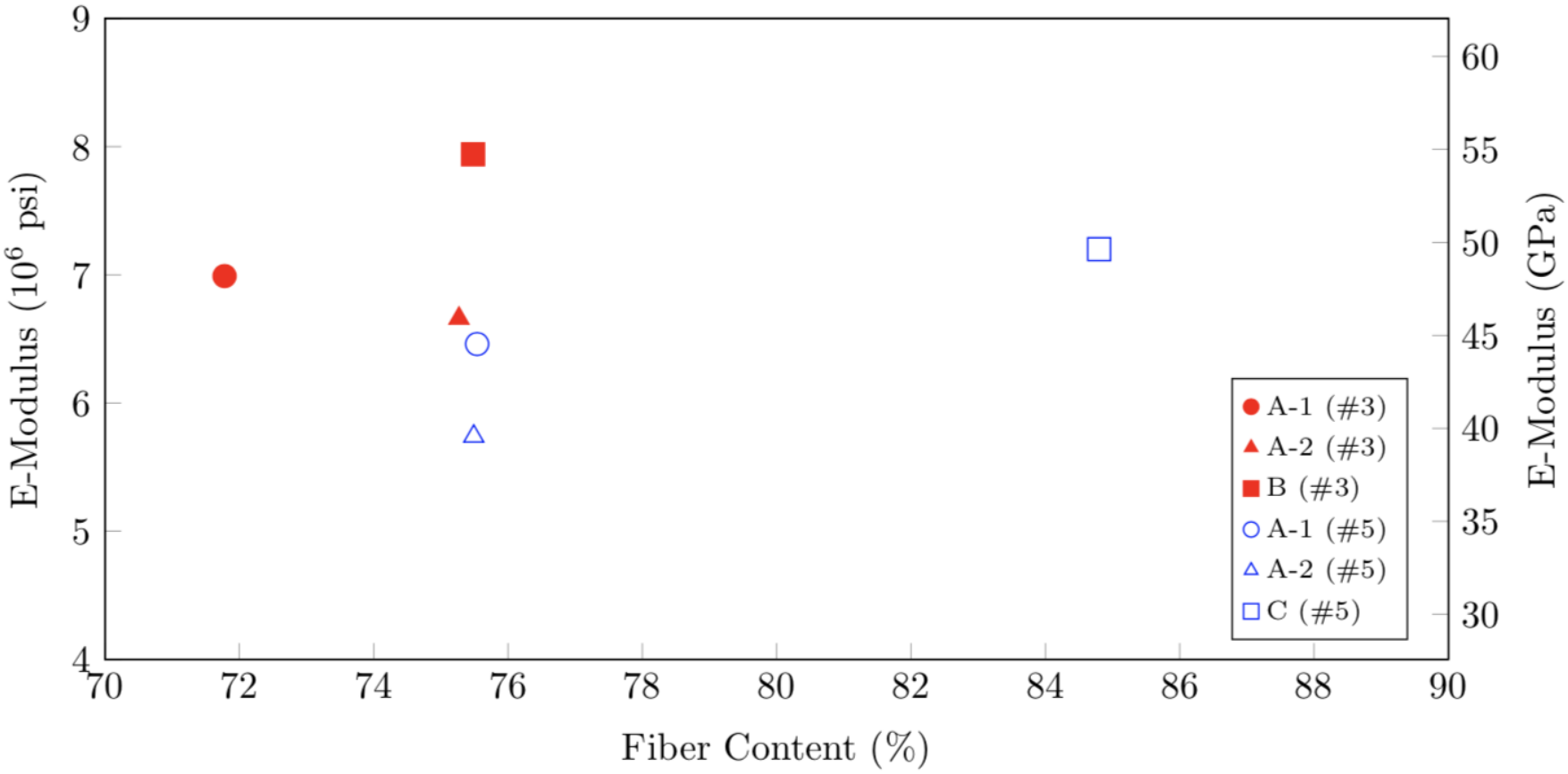
RESULTS: Tensile Stress VS Fiber Content



Minimum per ASTM D7957

RESULTS: E-Modulus VS Fiber Content



CONCLUSIONS

- Linear relation between tensile stress and fiber content
- Generally: Fiber content ↑, E-Modulus ↑
  - No clear trend defined
- Future Steps: Define the optimum fiber content

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Thank U!!

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