Advancing Understanding of CFRPs using ECT Through-Transmission Technique

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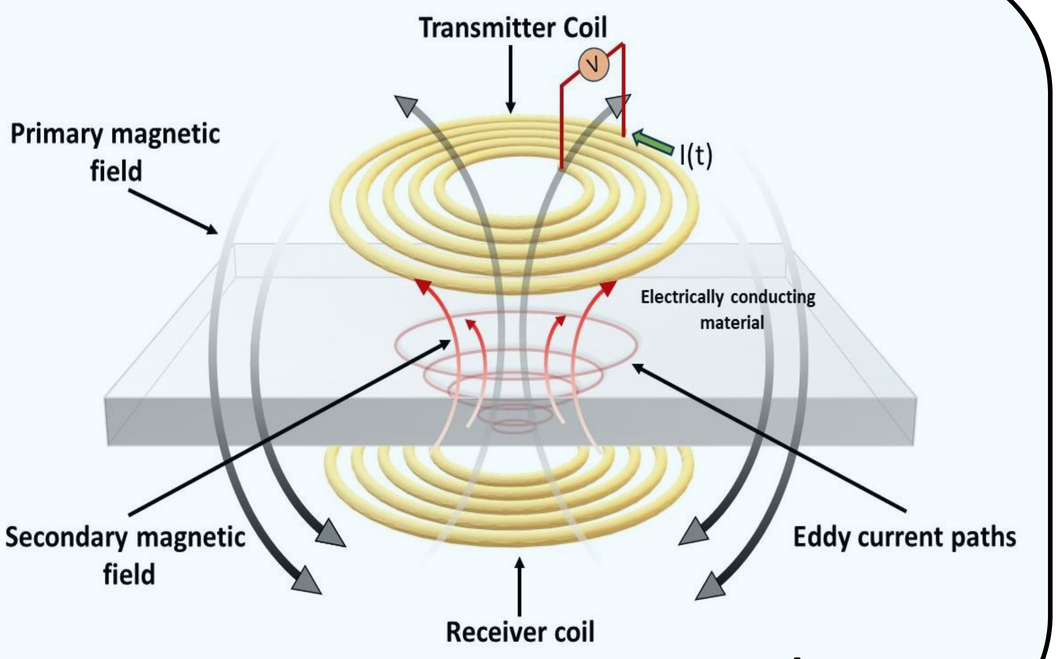
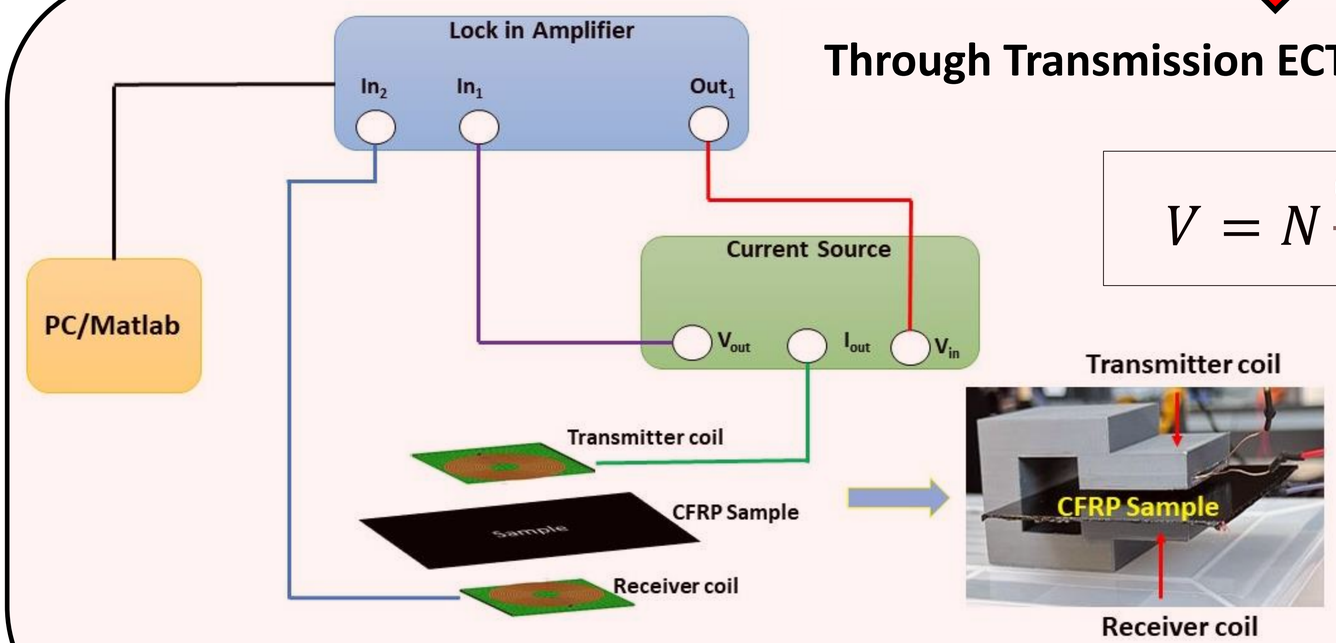
Introduction

- **NDT** ensures that **CFRP** components meet their **intended purposes** effectively.
- **ECT** offers **advantages** in cost, development time compared to other **NDT methods**.
- **CFRPs** present a **challenge** for ECT because of their **low electrical conductivity** making ECT data **difficult** to interpret.
- A **through transmission** ECT measurement is developed to measure **magnetic flux** that passes through **2-ply structures**.



Eddy Current Testing (ECT)

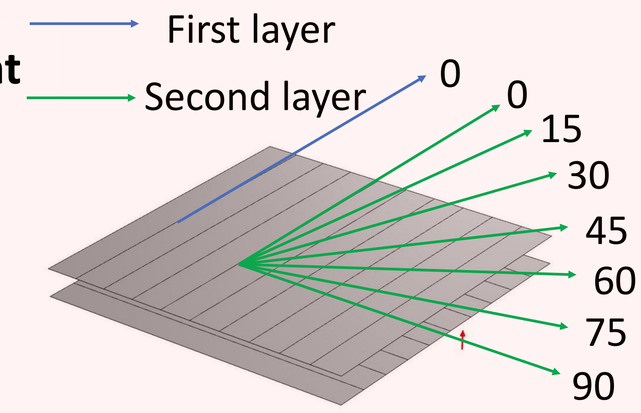
Experiments

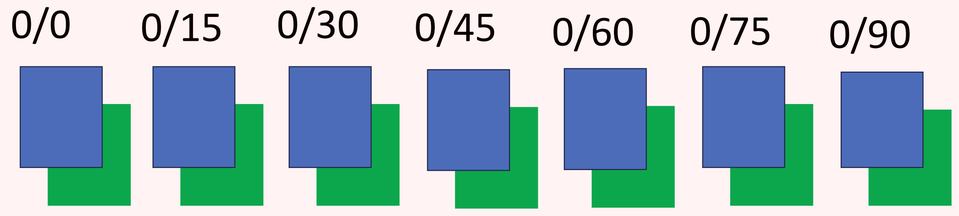


Through Transmission ECT measurement

$$V = N\frac{\mathrm{d}\phi}{\mathrm{d}t}$$

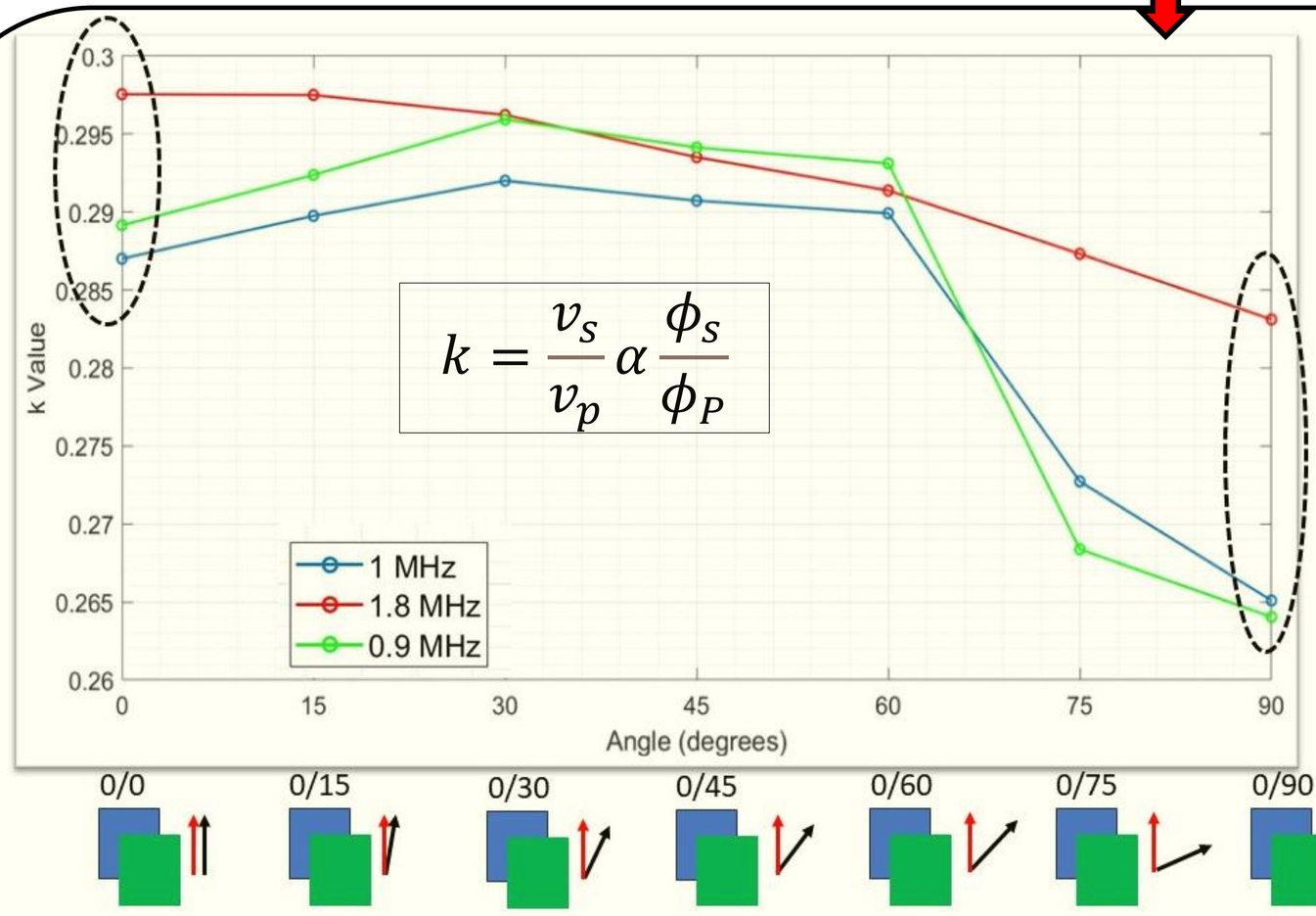
Schematic diagram of experimental setup





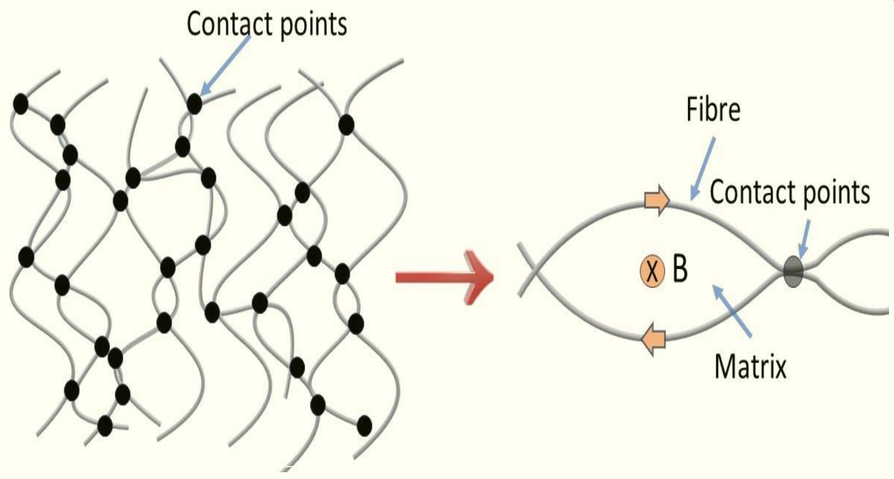
7, 2-layered samples of IM7/8552

Results



$$k = \frac{v_s}{v_p}\alpha\frac{\phi_s}{\phi_P}$$

Coupling coefficient vs ply orientation



Contact points and possible EC Paths in CFRPs

- **More contact points** leads to more EC paths thereby **stronger opposing** magnetic fields ultimately reducing **D.O.P**.

Conclusion

- **(0/90)°** ply orientation shields more magnetic fields as compared to the **(0/0)°** ply orientation.
- Symmetry **(pattern in the stacking sequence)** in CFRPs plays an important role for the **depth of penetration (DOP)** in CFRPs.
- This method is useful to **optimize sensor designs**, ultimately enhancing the **structural performance** of CFRPs.

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