



**TriDurLE**

**National Center for Transportation  
Infrastructure Durability & Life-Extension**

UTC Project Information – National UTC TriDurLE	
Project Title	Modeling and measurement of rebar corrosion and crack formation using high frequency ultrasonics in three dimensions and with no contact with the sample.
University	Florida Atlantic University.
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Funding Source(s) and Amount Provided (by each agency or organization)	TriDurLE: \$49,841 FAU (in-kind cost share): \$49,841
Total Project Cost	\$99,682 (including cost share)
Agency ID or Contract Number	
Start and End Dates	May 1, 2020 and ends June 30, 2021 (tentative)
Brief Description of Research Project	<p>The goal of this project is to demonstrate the ability to detect early appearance of cracks in reinforced concrete due to rebar corrosion, using ultrasonic nondestructive acoustic testing with no direct contact between the sensor and the concrete block, in conjunction with a poro-elastic ultrasound propagation model. The objectives are threefold: (1) Identify the proper measurement configuration and predict the performance, using the modeling of the ultrasound propagation in the reinforced concrete; (2) Perform a series of targeted measurements using the proper ultrasonic transducers on a set of existing reinforced concrete samples placed in partial or complete immersion; (3) Evaluate the degree of corrosion within the reinforced concrete with confidence levels according to the poro-elastic model, and correlate the results with those obtained (separately from this proposal) using traditional non-invasive techniques (e.g. corrosion current and corrosion potential measurements).</p> <p>The proposed poro-elastic model ties the physical properties of the porous medium (such as porosity, mean grain diameter, mass density, bulk modulus, shear modulus) to the sound propagation through the porous medium. It can also handle gradual changes of the physical characteristics of the medium and produce a synthetic response to a broadband acoustic impulse. This technique is very relevant in the</p>

	<p>material observed around the corroding bar.</p> <p>This research would be the foundation for a more detailed acoustic analysis of rebar corrosion detection in reinforced concrete pilings/columns out in the field.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented)</p> <p>Place Any Photos Here</p>	<p>This project has not started yet.</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>This project has not started yet.</p>
<p>Web links</p> <ul style="list-style-type: none"> <li>• Reports</li> <li>• Project website</li> </ul>	<p><a href="http://www.ome.fau.edu">www.ome.fau.edu</a></p>