

PREDICTION MODELS DEVELOPMENT FOR CONCRETE COMPRESSIVE STRENGTH DETERMINATION BY USING NON-DESTRUCTIVE TESTING (NDT)

Bolborea Bogdan^{1,2}, Gruin Aurelian¹, Baeră Cornelia^{1,3,4}, Enache Felicia¹, Vasile Vasilica¹

¹NIRD URBAN-INCERC, ²Politehnica University of Timisoara, Civil Engineering Faculty, ³Technical University of Cluj-Napoca, ⁴Politehnica University of Timisoara, Research Center in Engineering and Management

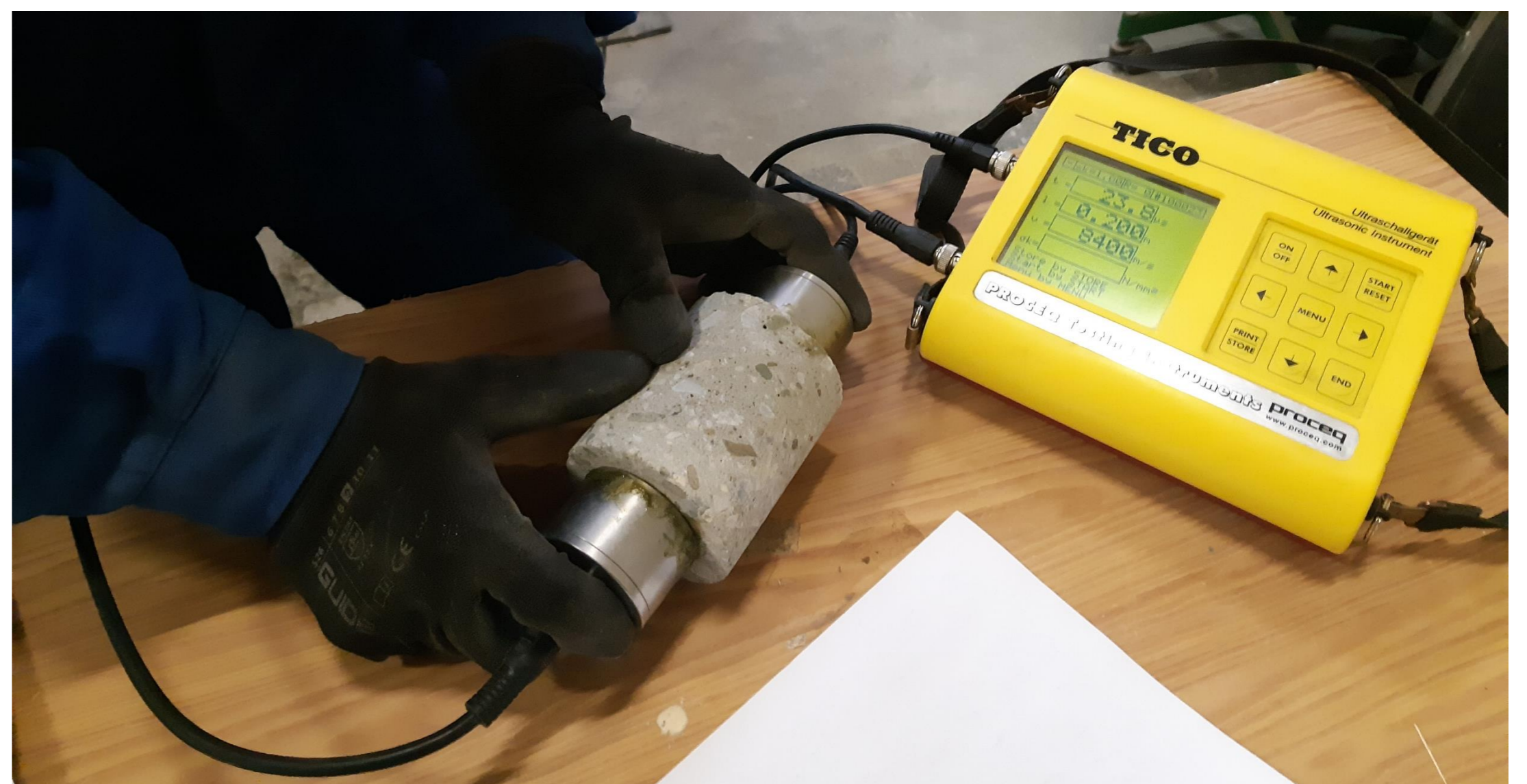
I. THEORETICAL CONCEPT OF THE PROPOSED METHOD



Concrete samples used for the study

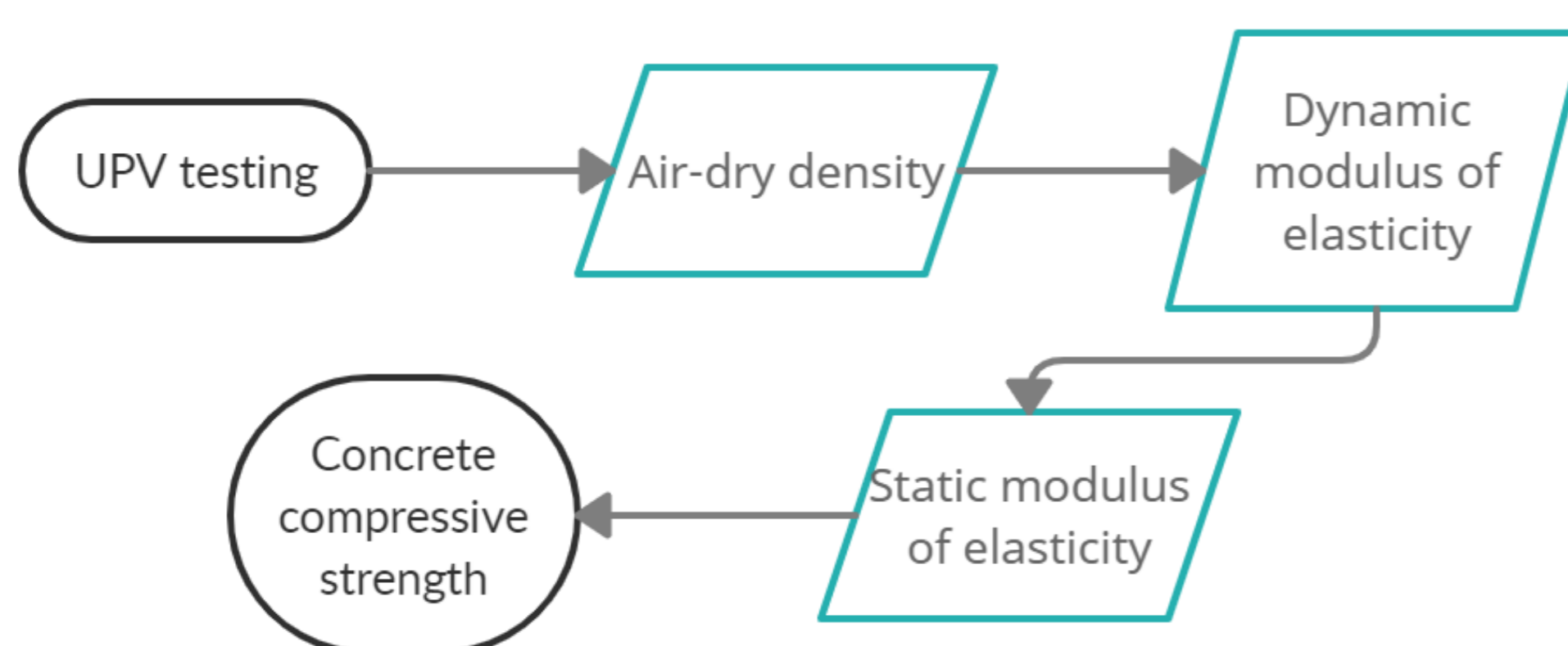
The proposed NDT methodology mainly consists in two complementary, noninvasive procedures: a) the **ultrasonic testing** of the concrete elements, performed on site; b) the mathematical interpretation of the data, taking in consideration the **moduli of elasticity** (static and dynamic).

NDTs are a possible and viable alternative, mainly in terms of profitability and also because they produce results quickly. However, NDT techniques measure indicators sensitive to a certain property of concrete.



UPV testing of the concrete core sample

II. FLOWCHART OF THE METHOD



The flowchart of the proposed method – sequence of experimental and theoretical steps

The flowchart of the proposed method consists in the sequence of the major considered steps, in terms of experimental testing (black curve contour) and the corresponding parameters (light blue contour) determined by using the previous collected data.

III. CONCLUSIONS

Preliminary conclusions:

- The proposed method delivered results with accuracy ranging between 84% and 100%.
- Compared to the SONREB method, the main advantage of the proposed method is that it can be applied without previous information about the concrete mix, usually difficult to obtain.

Acknowledgments:

This paper was financially supported by the Project "Entrepreneurial competences and excellence research in doctoral and postdoctoral programs - ANTREDOC", project co-funded by the European Social Fund financing agreement no. 56437/24.07.2019.

This paper is supported by the Programme: Research for sustainable and ecological integrated solutions for space development and safety of the built environment, with advanced potential for open innovation – "ECOSMARTCONS", Programme code: PN 19 33 04 02: "Sustainable solutions for ensuring the population health and safety within the concept of open innovation and environmental preservation", financed by the Romanian Government.