

Professor Y. Cengiz Toklu, Ph. D.

Professor Toklu obtained his BS and MS degrees in Civil Engineering from Middle East Technical University, Ankara Turkey and his doctorate from Universite de Pierre et Marie Curie (Paris VI), Paris, France. In his professional life he directed and/or supervised numerous giant construction projects in Turkey, including a pontoon bridge, a long span suspension bridge, a light railed transportation system, and several motorways. In academic life he taught in several universities starting with Middle East Technical University, serving in many cases as Department Head or Dean. Being a member of several technical and scientific international and national organizations, he is currently affiliated to Beykent University in Istanbul, Turkey. His research interests include application of optimization techniques to engineering, application of Artificial Intelligence concepts to engineering, space civil engineering, nonlinear analysis of structures, engineering education and construction scheduling. He is the author of several books, book chapters and scientific articles. He has organized many congresses and served as keynote speaker in many international meetings. Dr. Toklu is the developer of the method “Total Potential Optimization using Meta-heuristic Algorithms (TPO/MA)” that gave way to the method Finite Element Method with Energy Minimization (FEMEM) which is shown to be more successful than classical methods in analyzing non-linear structural systems, under-constrained structures, unstable structures, degenerate structures and structures with non-unique deformed shapes. His current research is on producing lunar soil simulant and lunar construction materials including lunar bricks, lunar concrete, and the like.

RESEARCH GROUP

Research group is headed by Professor Y. C. Toklu and is based on Beykent University, in Istanbul. It includes researchers from two other universities, namely Istanbul University - Cerrahpasa and Osmangazi University. The group includes 3 Associate Professors, 2 Assistant Professors, and several assistants.

Some recent journal publications of the group on the subject which will be given to the student are listed below:

- Toklu, Y. C., Bekdaş, G., Yücel, M., Nigdeli, S. M., Kayabekir, A. E., Kim, S., Geem, Z. W. (2021) Total Potential Optimization using Metaheuristic Algorithms for Solving Non-linear Plane Strain Systems, Applied Sciences, 11, 3220. [SCIE], <https://doi.org/10.3390/app11073220>
- Toklu, Y.C, Kayabekir, A.E., Bekdaş, G., Nigdeli, S.M., Yucel, M. (2020) Analysis of Plane Stress Systems via Total Potential Optimization method considering non-linear behavior of stress-strain relationships. ASCE Journal of Structural Engineering. Vol. 146, No. 11, November 2020 [SCIE] <https://ascelibrary.org/doi/pdf/10.1061/%28ASCE%29ST.1943-541X.0002808>
- Kayabekir, A. E, Toklu, Y. C., Bekdaş, G., Nigdeli, S. M., Yücel, M., Geem, Z. W. (2020). A Novel Hybrid Harmony Search Approach for Analysis of Plane Stress Systems via Total Potential Optimization. Special Issue: "Harmony Search Algorithm - Theoretical Background and Practical Applications. Appl. Sci., 10(7), 2301. [SCIE] <https://doi.org/10.3390/app10072301> WOS:000533356200100
- Bekdas, G., Kayabekir, A. E., Niğdeli, S. M., Toklu, Y. C. (2019). Advanced Energy Based Analyses of Trusses employing Hybrid Metaheuristics. The Structural Design of Tall and Special Buildings. 28(9) e1609 [SCIE] DOI: 10.1002/tal.1609 <http://dx.doi.org/10.1002/tal.1609> WOS:000468788000005
- Toklu, Y. C. (2018). Application of Big Bang - Big Crunch Optimization to Resource Constrained Scheduling Problems. KSCE Journal of Civil Engineering, Vol. 22 No.12 (December 1, 2018) [SCIE] DOI: 10.1007/s12205-017-1549-y
- Toklu, Y. C., Bekdas, G, Temur, R. (2017). Analysis of Cable Structures Through Energy Minimization. Structural Engineering and Mechanics, Vol. 62, No. 6, 749-758, [SCIE] DOI: <https://doi.org/10.12989/sem.2017.62.6.749> WOS:000405241200009
- Toklu, Y. C. and Uzun, F. (2016). "Analysis of Tensegric Structures by Total Potential Optimization Using Metaheuristic Algorithms." Journal of Aerospace Engineering, Vol. 29, No. 5, September 2016: 04016023. [SCIE] DOI: 10.1061/(ASCE)AS.1943-5525.0000571

A more detailed list can be found in the CV of Dr. Toklu given in the web page <https://cengiztoklu.com>

WORK DESCRIPTION

The method Total Potential Optimization using Metaheuristic Algorithms (TPO/MA) is an emerging structural analysis technique which has many advantages over classical method in solving certain problems. It is forwarded by Dr. Toklu, and its area of application is widening day by day. It also deserves the name Finite Element Method with Energy Minimization (FEMEM) since it is based on the same principles of the well-known Finite Element Method (FEM).

The student will be asked to make some new applications together with the group using this method. Some examples of the applications done till now can be seen in the publications mentioned in the page “RESEARCH GROUP”.

The student chosen for these studies must have an important structural engineering and coding background and familiarity with the FEM. Knowledge about optimization and metaheuristic algorithms will be a further advantage, but not a must.

FURTHER INFORMATION

THE CITY – ISTANBUL

Istanbul is a city with about 15 million population forming a bridge between two continents. It was the capital of three empires. It is a city where you can find everything you are looking for.

<https://en.wikipedia.org/wiki/Istanbul>

FINANCIAL SITUATION

Currently the currency rates are such that 900€ is approximately equal to the salary of a full professor in Turkey. Thus, a student will have very comfortable life in Turkey with that allowance. It may not be necessary but there may be a possibility for lodging in student dormitories. Further income through some funded projects also may be arranged.

THE UNIVERSITY

Beykent University has a number of campuses in the town. The one where the group is located is the Sariyer Campus, on the European side, very close to all city transportation facilities.

<https://www.beykent.edu.tr/en/mainpage>

COVID-19

Currently, due to this Covid-19 pandemic, education is continuing with online facilities. If the pandemic continues during the internship time, of course everything will continue online. Otherwise the studies will be face to face, evidently.