A recent study at Carleton University reveals new insight on the effect of cracking and steel reinforcement on the electrical resistivity measurements in concrete structures. The electrical resistivity of concrete is a parameter that is related to the durability characteristics of concrete and can be easily utilized in the inspection of concrete structures. However, under real conditions, structures are subjected to various types of cracking that would affect the resistivity measurement. Moreover, the presence of steel rebar in concrete can interfere with the passage of electrical current in concrete. This is the topic of the M.Sc. thesis entitled "Numerical investigation of the effects of cracking and embedded reinforcement on surface concrete resistivity measurements using Wenner probe" completed by Mr. Mustafa Salehi at Carleton University in 2013. As part of his research project, he investigated various cracking types and rebar configurations and suggested the best method of resistivity measurement in order to improve the accuracy of concrete quality assessment using this method. A copy of this thesis can be downloaded from [here](https://www.giatecscientific.com).
In this numerical study, finite element method has been used to investigate this issue by carrying out a parametric investigation. Some of the analysis parameters of the study involved (1) crack dimensions, (2) crack locations and orientations with respect to the probe position, (3) density and location of embedded reinforcement, (4) orientation of the probe with respect to reinforcement, and (5) moisture content of concrete. It was demonstrated that depending on the location and geometrical properties of the crack as well as its angle with respect to the Wenner probe, concrete resistivity measurements can contain considerable errors. The presence of rebar mesh and its misalignment with respect to the crack and the measurement direction exacerbated the errors – in some cases by over 100%. Suggestions were provided to help minimize the effects of the cracks on electrical resistivity measurements.