Short Course 3: Electric Road Systems
Thursday, June 20th, 2019
2:00PM – 5:40PM (3:20PM-4:20PM Coffee Break in Exhibit Hall)
Venue: Legacy 2

Instructor:
Francisco Marquez-Fernandez - Lund University, Sweden

Short Biography:
Francisco J. Márquez-Fernández was born in Huelva (Spain) in 1982. In 2006 he graduated as a M.Sc. on Industrial Engineering with a major in Industrial Electronics from the University of Seville (Spain). He received his Ph.D. in Electrical Engineering in 2014 Lund University in Sweden. Between December 2014 and June 2016 he was a Post-doctoral Research Assistant with the Energy and Power Group at the University of Oxford, UK. Currently he is appointed as a Researcher at the Div. of Industrial Electrical Engineering and Automation, Lund University, and the Swedish Electromobility Centre. His research interests are mostly related to transport electrification, spanning from the design of new topologies of electrical machines and power electronic drives to charging and energy management strategies for electric vehicles and their interaction with the power grid.

Summary:
Electric Vehicles (EVs) are nowadays readily available in the market, and for the most part, their performance is comparable to that of their ICE-powered counterpart, if not better. Moreover, alongside the development of technology, EVs are also slowly becoming economically competitive. However, there is still one big issue that prevents mass adoption of EVs: providing acceptable range with reasonable charging times. Looking at the market evolution, the battery capacity installed onboard the vehicles has increased substantially over the last few years. This not only makes the vehicles more expensive, but also implies carrying an unnecessary weight onboard all the time for a piece of equipment that is seldom needed. Additionally, in those occasions in which the large battery capacity is actually needed, the time required to recharge the battery is generally much longer than what it takes to refill a conventional fuel tank, making it unpractical. These problems are even more severe when electrifying heavy-duty commercial vehicles.
A possible solution to this challenge is to supply energy to the vehicles as they drive over certain sections of the road, so called dynamic charging or Electric Road Systems (ERS). Part of this energy will be used to propel the vehicle while the rest could be stored in the onboard battery, to cover for those sections of the road that are not electrified. As it will be shown in the course, a sufficiently dense ERS network would lead to significantly less need for EV batteries, much lower need for fast charging stations and an overall lower electromobility cost. However, there are some challenges associated with ERS as well, and in order to assess them, several pilot-tests are currently being demonstrated on public roads.