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Benedetto Piccoli is Distinguished Professor and the Joseph and Loretta Lopez Chair Professor of Mathematics at Rutgers University - Camden. He also serves as Vice Chancellor for Research.

His research interests span various areas of applied mathematics, including control theory, traffic flow on networks, crowd dynamics, math finance and application to autonomous driving, population health and bio-medical systems. He is author of more than 300 research papers and 7 books and is the founding editor of Networks and Heterogeneous Media.

Piccoli is the recipient of the 2009 Fubini Prize, Plenary speaker at ICIAM 2011, and 2012 inaugural Fellow of American Mathematical Society.

Title: New approaches for the modeling and control of multi-agent systems

Abstract:
We review some recent results on the modeling and control of large systems of agents, with particular focus on applications to social systems (as opinion dynamics), pedestrians' movements (also called crowd dynamics), and vehicular traffic. There is a natural parallel to gas and fluid dynamics, but also profound differences, for example agents inject energy into the system, thus preventing the typical conservation of momentum and energy. Similarly, the control problems posed by such systems are new and require innovative methods, such as sparse controls, bounded variation controls, mean-field limit, and defining new control problems for measures. After reviewing several approaches, we discuss some future research directions of potential interest. We conclude by illustrating a recent real-life experiment using autonomous vehicles on an open highway to smooth traffic waves. This opens the door to a new era of interventions to control in real-time multi-agent systems and to increase the societal impact of such interventions guided by control research.