Approximately 1 in 1000 infants are noted to have a brachial plexus palsy at the time of birth – resulting in paralysis of all or part of the infant’s arm. On average, 10% of these injuries are “permanent” – with residual paralysis after 1 year of age. For over 100 years, efforts have been made to understand the mechanism of brachial plexus injury within newborns and reduce its incidence. Due to the relatively rare nature of the injury, and the sensitivity of conducting studies that involve pregnant women and infants, typical experimental methods in injury biomechanics have not been appropriate or available to better understand this injury. In the past 15 years, modern modeling techniques – both computer models and physical models – have been developed to gain greater insight into the injury mechanisms. But the development of models that cannot be fully validated presents its own challenges that must be addressed.

This seminar will present a brief overview of the clinical aspects of neonatal brachial plexus injuries before describing some of the modeling efforts that have been undertaken to study this injury, with a focus on the development of computer models. The challenges involved with the development and interpretation of models of neonatal injury will be discussed. Opportunities for future study in this area will be introduced, with a focus on developing an interdisciplinary approach to this complex question.

Michele Grimm is an Associate Professor and Undergraduate Program Chair in Biomedical Engineering at Wayne State University in Detroit, MI. She earned her BS in Biomedical Engineering and Engineering Mechanics from The Johns Hopkins University and her MS and PhD in Bioengineering from the University of Pennsylvania before joining the faculty of Wayne State in 1994. At WSU, she has had the opportunity to work with and learn from world leaders in the area of injury biomechanics. Her research over the past 25 years has touched on many areas of tissue biomechanics – from brain to bone. In 1997, she was approached by an obstetrician and asked to collaborate to develop a model that could increase our understanding of shoulder dystocia and the mechanisms of neonatal brachial plexus injury. Since then, she has become a recognized expert in this area – having recently been asked to serve as the only biomedical engineer on the American College of Obstetrics & Gynecology working group on neonatal brachial plexus palsy. Dr. Grimm is a Fellow in the American Society of Mechanical Engineers as is currently the past chair of the Bioengineering Division of ASME. In addition to her research in tissue biomechanics, her primary activities and interest focus on academic program and curriculum development, both in biomedical engineering and more broadly in the realm of higher education.

Achievement Awards.