Conclusion: Low pressure DC discharges were modeled using Plasma Module of the COMSOL FEM software package. Modeling revealed that electron emission mechanisms (secondary emission vs. thermionic emission) as well as boundary conditions on discharge tube walls strongly influence both the plasma distribution and the electrical characteristics of the discharges. Moreover, the self-sustained DC glow discharge has a rising trend of I-V characteristics with positive differential resistance, having an apparent voltage threshold associated with the secondary emission cross-section. Alternatively, the thermionic discharge has a falling trend of I-V characteristics with negative differential resistance typical of gaseous arc plasmas [3].

References: