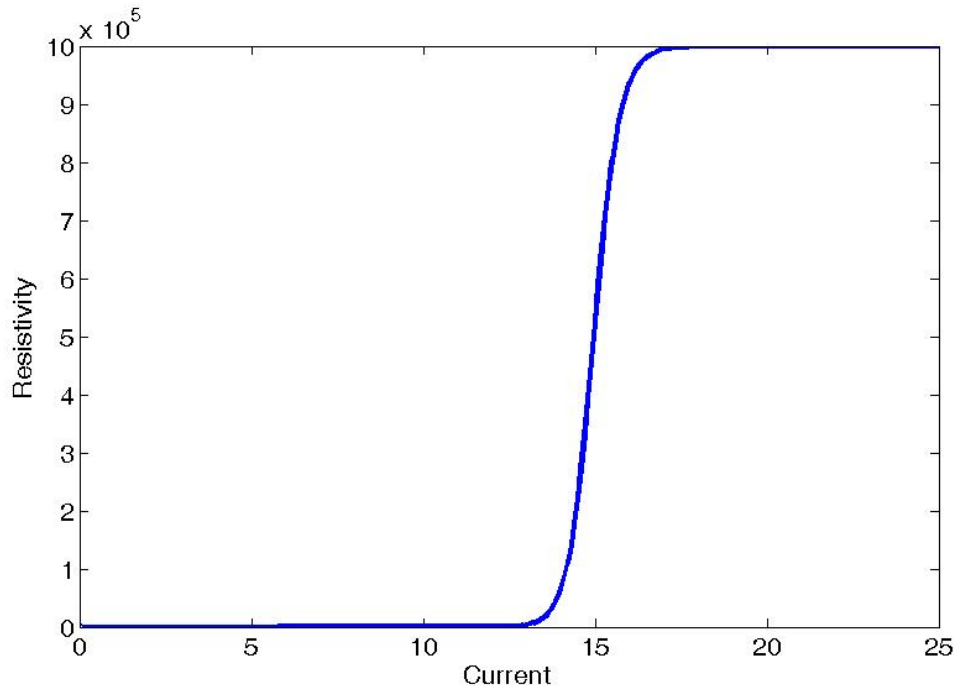


There are two models. Electrical current(ec) is used for solve the current distribution. PDE(c) is used for calculate the resistivity depended on current using analytic equation:

$$(E0*ec.normJ^40/super_jc^41)*rhon/(E0*ec.normJ^40/super_jc^41+rhon)+1e-10$$

This equation can describe the change of resistivity with current shown in the following figure.

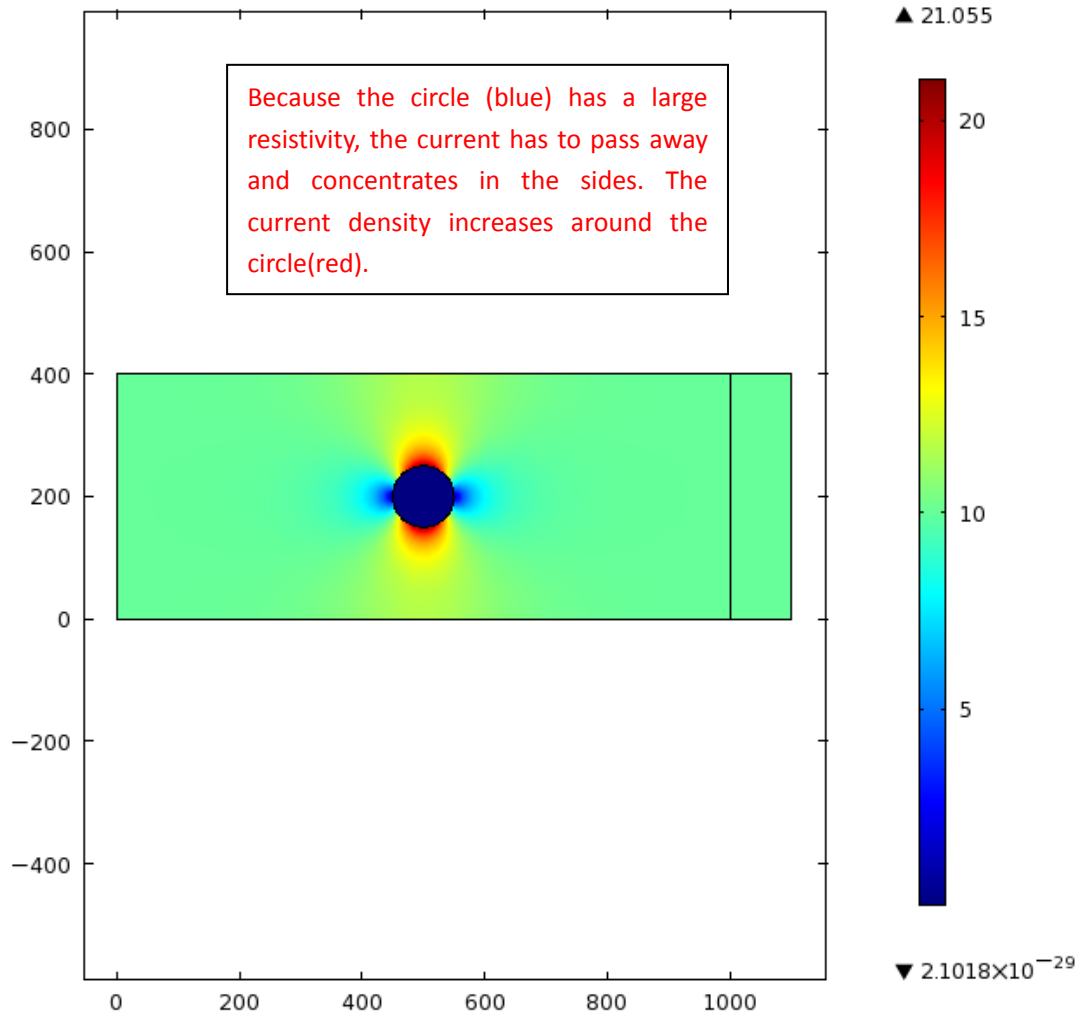


When I set the Electric conductivity of superconducting material $1e20$ S/m, I can get the expected result. The solution of PDE which describes the resistivity shows that around the circle the resistivity is increased as the current is higher than $super_jc$ which is used in the above equation to decide the level of rapid jumping of resistivity.

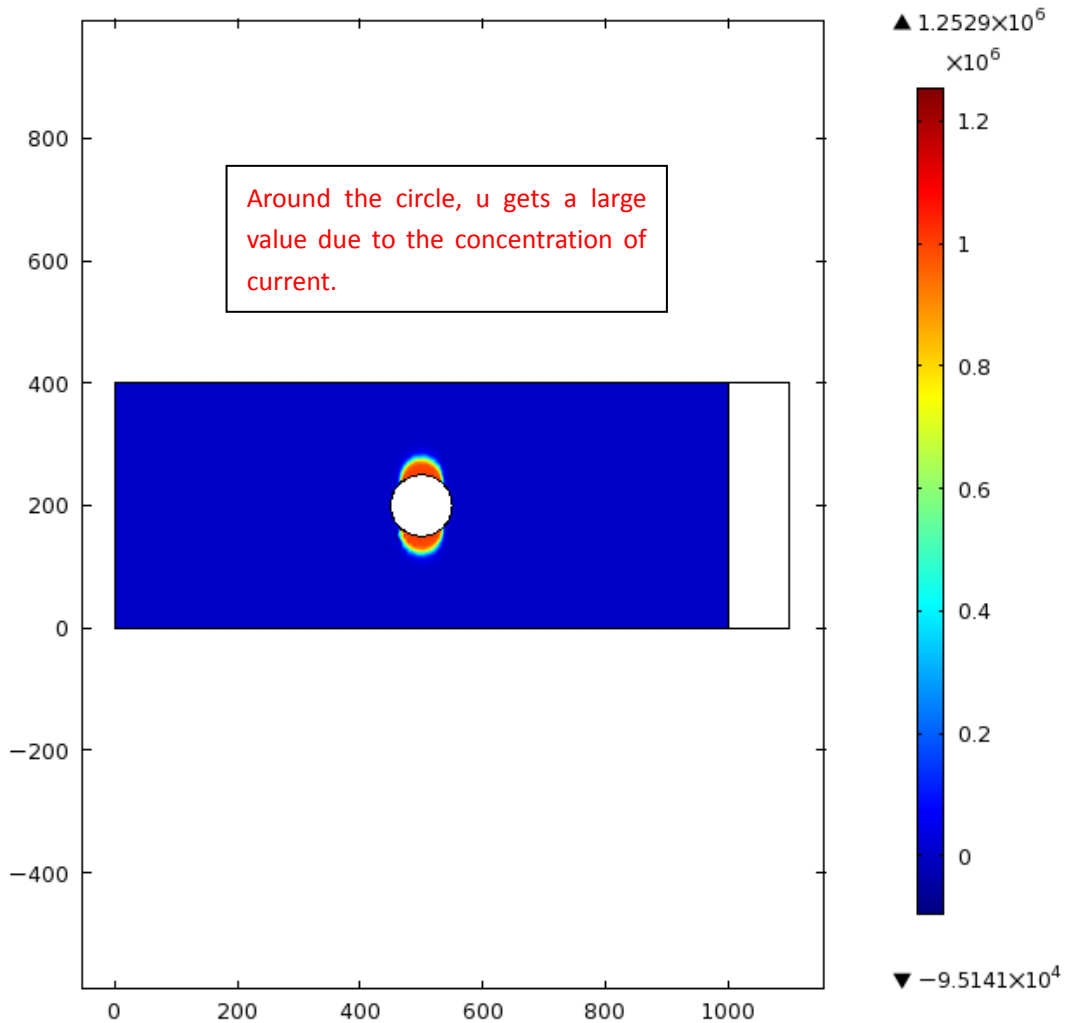
The screenshot shows a software interface with a tree view on the left and a properties panel on the right. The tree view includes 'Materials', 'hotspot', 'superconducting', 'resistor', 'Electric Currents (ec)', 'PDE (c)', 'Mesh 1', 'Study 1', and 'Results'. The 'superconducting' material is selected. The properties panel shows 'Material Properties' and 'Material Contents'.

Property	N...	Value	Unit	Property grc
Relative permittivity	ep...	1	1	Basic
Electric conductivity	sigma	1e20	S/m	Basic

Surface: Current density norm (A/m²)



Surface: Dependent variable u



Then I set the Electric conductivity of superconducting material $1/u$ S/m and use segregated solver. An error jump.

Materials

- hotspot
- superconducting
- resistor

Electric Currents (ec)

Δu PDE (c)

Mesh 1

Study 1

Results

Basic Properties

Electrochemistry

Electromagnetic Models

Solid Mechanics

Piezoelectric Models

Gas Models

Material Contents

Property	N...	Value	Unit	Property gr
Relative permittivity	ep...	1	1	Basic
Electric conductivity	sigma	$1/u$	S/m	Basic

