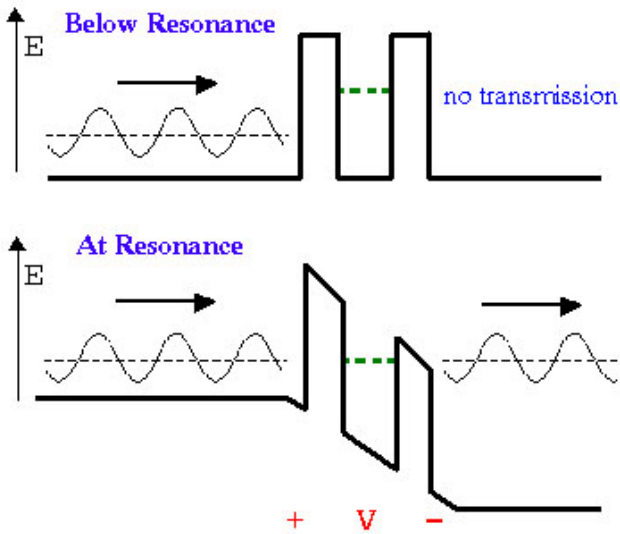


## Resonant Tunneling Diode Learning Materials



By completing the [Resonant Tunneling Diode Simulation with NEGF](#), users will be able to: a) understand the principle of operation of resonant tunneling diode, b) the meaning of the quasibound states, resonant and non-resonant tunneling and c) the concept of quantum interference which is the basis for the formation of quasi-bound states and the operation of a Resonant Tunneling Diode.

The specific objectives of the Resonant Tunneling Diode Module are:

Physical Model	Mathematical Model	Computational Model
<p>a) Introduce the concept of:</p> <ul style="list-style-type: none"> <li>- Quantum interference</li> <li>- Quasi-bound states</li> <li>- Resonant Tunneling</li> </ul>	<p>b) Apply Mathematical techniques for calculating:</p> <ul style="list-style-type: none"> <li>- Transmission Coefficient</li> <li>- Current density</li> </ul>	
<p>c) Validate Resonant Tunneling Diode Lab by running the examples provided</p>		

## Recommended Reading

Users who are new to the principles of operation of a resonant tunneling diode should consult the following resource:

Hiroshi Mizuta and Tomonori Tanoue, *The Physics and Applications of Resonant Tunneling Diodes* (Cambridge Studies in Semiconductor Physics and Microelectronic Engineering).

### Theoretical descriptions

- \* [Resonant Tunneling Diode operation](#)
- \* [RTD with NEGF Demonstration: Basic RTD Asymmetric](#)
- \* [NEMO 1-D: The First NEGF-based TCAD Tool and Network for Computational Nanotechnology](#)
- \* [Application of the Keldysh Formalism to Quantum Device Modeling and Analysis](#)

### Exercises and Homework Assignments

1. [Exercise: Resonant Tunneling Diode](#)

### Solutions to Exercises

Solutions are provided only to instructors!

### Evaluation

This test will assess the users conceptual understanding of the physical, mathematical and computational knowledge related to operation of Resonant Tunneling Diodes.

[RTD Topic Page: Test for Resonant Tunneling Diode](#)

### Challenge

Users are challenged to integrate what they have learned about operation of Resonant Tunneling Diodes.

[Resonant Tunneling Diodes: an Exercise](#)