Project 2:
In search of the Globally Optimal Shape of Patents for the North and South

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In this project, I plan to extend the canonical North-South trade model that Helpman (1993) pioneered more than three decades ago mainly by allowing patents to carry a finite length, as in the real world. This is a critical extension in that the North-South dynamical system will then be formed by a set of **mixed-typed functional differential equations** (**MFDEs**) rather than by a set of **ordinary differential equations** (**ODEs**), thereby presenting a big computational challenge.

For the model to be closer to reality, I also introduce another extension by allowing technological innovation to display diminishing marginal productivity. With these two extensions, it becomes possible for the first time in the international economics literature to analyze the globally optimal patent shape facing the world's developed and developing countries.

In the project, I plan to accomplish the two main tasks:

- Robustness checks: I plan to verify whether the conclusions of Helpman (1993) can hold in the extensive North-South model?
- First-best solution: I plan to compute the first-best solution for the world's uniform patent system by optimizing a typical patent's shape in the two dimensions: *patent length* vs. *patent breadth*.