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*Main Research Interest:* **Mathematical Logic  
Computability and Complexity, Effective Combinatorics**

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My research is focused on mathematical logic, computability and complexity, set theory, effective aspects of combinatorics. I also have interest in computable model theory, reverse mathematics, effective descriptive set theory, etc.

In computability theory, relative computability is a central topic, where a problem A is computable relative to a problem B if A can be computed via a Turing machine, with B as oracle. It measures information contents of problems, and provides a natural classification of unsolvable problems. Equivalence classes under this relation are called Turing degrees. One longstanding goal of computability theory is to understand the algebraic properties of the structure of computably enumerable degrees, those Turing degrees containing computably enumerable sets, and the interactions between computably enumerable degrees and other levels in the Ershov Hierarchy.

Isolation phenomenon was first discovered in 1995 as an approach to local definability of c.e. degrees in the d.c.e. degrees. At the very beginning, people only considered the isolation phenomenon separately, such as the density of isolated degrees in the computably enumerable degrees. My recent work tries to apply the isolation idea to other degree structural properties, such as lattice embeddings and nonbounding phenomenon

in the 2-c.e. degrees. In 2004, I proposed the notion of pseudo-isolated degrees, a class of nonisolated degrees, actually, according to the classic definition, but these degrees are isolated by d.c.e. degrees. Several structural properties, local or global, of Turing degrees are still unknown, and one of our goals is to find new local structural properties to solve those global problems of Turing degrees.

My work on algorithmic randomness focuses on the presentations of computably enumerable reals and various degrees of Chaitin's Omega-numbers. In 2006, I proved that the truth-table degrees of Chaitin's Omega-numbers depend on the universal machines selected. This solved a problem proposed by Miller and Nies in this area. We are interested in the relation between strong reducibilities and various notions of randomness of reals.

### **Selected Recent Publications:**

- [1] **G. Wu**, *On the density of the pseudo-isolated degrees*, Proceedings of London Mathematical Society 88 (2004), 273-288.
- [2] **G. Wu**, *1-Generic splittings of computably enumerable degrees*, Annals of Pure and Applied Logic 138 (2006), 211-219.
- [3] S. Figueira, F. Stephan, **G. Wu**, *Randomness and universal machines*, Journal of Complexity, 22 (2006), 738-751.