

## Professor Chen Xiao-jun

### Research interests include:

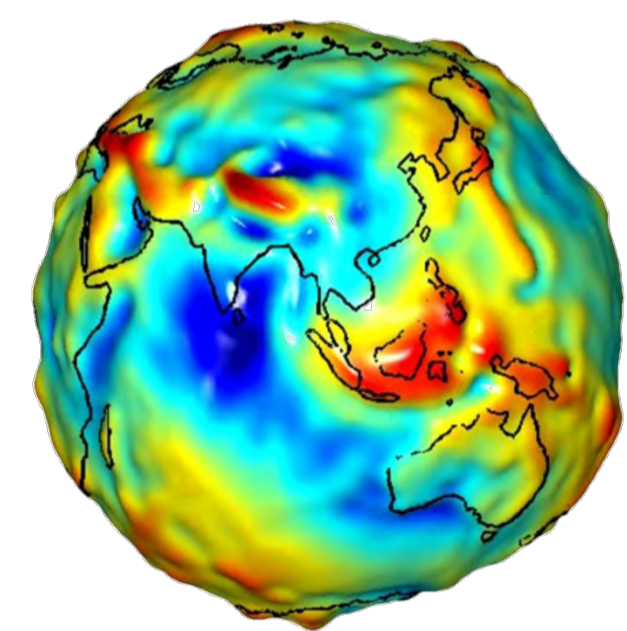
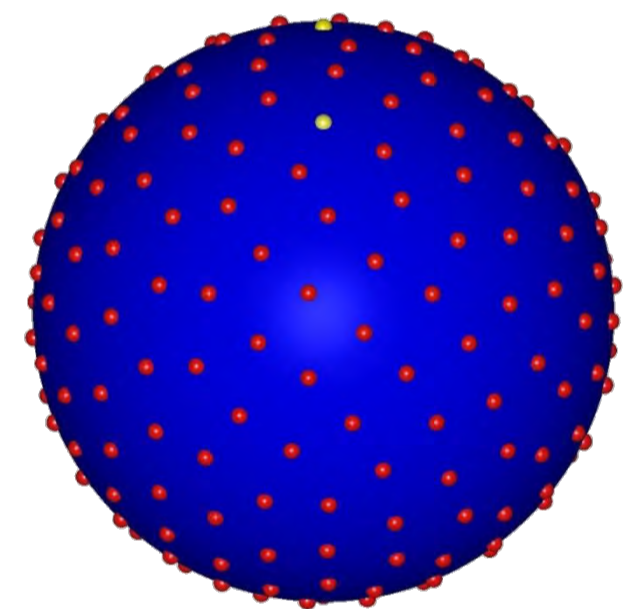
- **Nonlinear/singular/nonsmooth equations**
- **Complementarity problems**
- **Nonsmooth optimization**
- **Verification methods**
- **Stochastic optimization**
- **Spherical t-designs**
- **Approximation on spheres**

## On-going GRF project

### **Efficient Methods for Nonsmooth, Nonconvex Optimization**

Nonsmooth, nonconvex optimization has become essential in many important engineering and economics applications such as image restoration, signal reconstruction, variable selection, optimal control, robust equilibrium problems under uncertainty and spherical approximation. This project aims to develop effective and innovative methods for nonsmooth, nonconvex optimization.

The project consists of three parts. First, we derive new theoretical results on necessary and sufficient optimality conditions for nonsmooth, nonconvex optimization and use these conditions to investigate various important properties, such as the sparsity and stability of stationary points and local and global optimal solutions. Second, we construct efficient algorithms for solving nonsmooth, nonconvex optimization by combining smooth approximation techniques and efficient methods for smooth optimization. Moreover, we will establish error bounds of numerical solutions to the true solutions. Finally, we apply the new theory and algorithms to applications in image restoration, signal reconstruction, variable selection and spherical approximation.



10201 extremal points and weights for degree 100

