

Field Concentrations in Plasmonics and Linear Elasticity

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When two inclusions are close to touching, the physical field such as the stress or the electric field may be arbitrarily large in the narrow region between the inclusions. In this talk, the speaker will present the recent developments on the quantitative understanding of the field concentrations. This problem is required to analyze the Neumann-Poincare operator on two nearly touching domains. The speaker will consider 3D plasmonic spheres systems. He will show how the plasmonic resonant fields (or the spectral properties of the NP operator) behave when the particles get closer. The plasmonic sensing by strong interaction between the particles will also be discussed. The speaker will also consider the stress concentration, which is a similar problem in the linear elasticity. He and his collaborators found singular functions which characterize the stress blow-up in the narrow region. As an application of their singular functions, they are able to justify the asymptotic formulas for the effective properties of a densely packed elastic composite.