

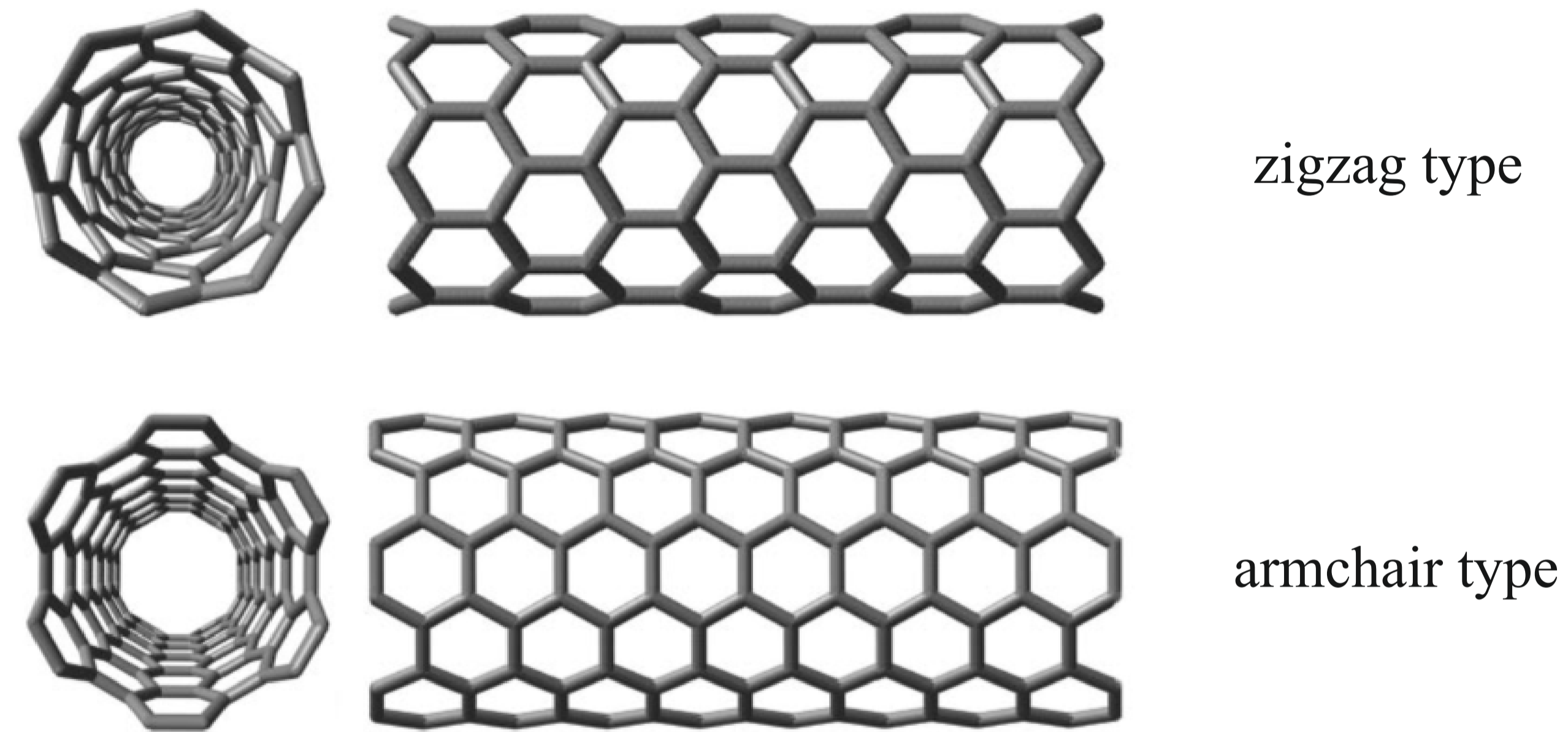
# Quantum plasmonics of achiral carbon nanotubes

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**Idea:** study the size dependences of the transverse surface plasmon resonance frequencies of zigzag and armchair carbon nanotubes (CNTs).



## Geometry of the problem

The calculations were carried out for achiral single-walled CNTs of the "zigzag" and "armchair" types, which have a metallic type of conductivity.

On figure 1 shows the size dependences of the transverse surface plasmon resonance frequency for single CNTs of the indicated types. It was found that the nature of the curves does not depend on the medium in which the CNTs are located. It is shown that as the nanotube radius increases, the transverse surface plasmon resonance (SPR) frequency decreases, while SPR frequency oscillations appear for nanotubes with relatively large radii. In addition, size oscillations take place near the curves of the classical size dependence of the plasma frequency.

**Summary:** It can be argued that quantum size effects are noticeable for transverse SPR in CNTs of relatively large radius.

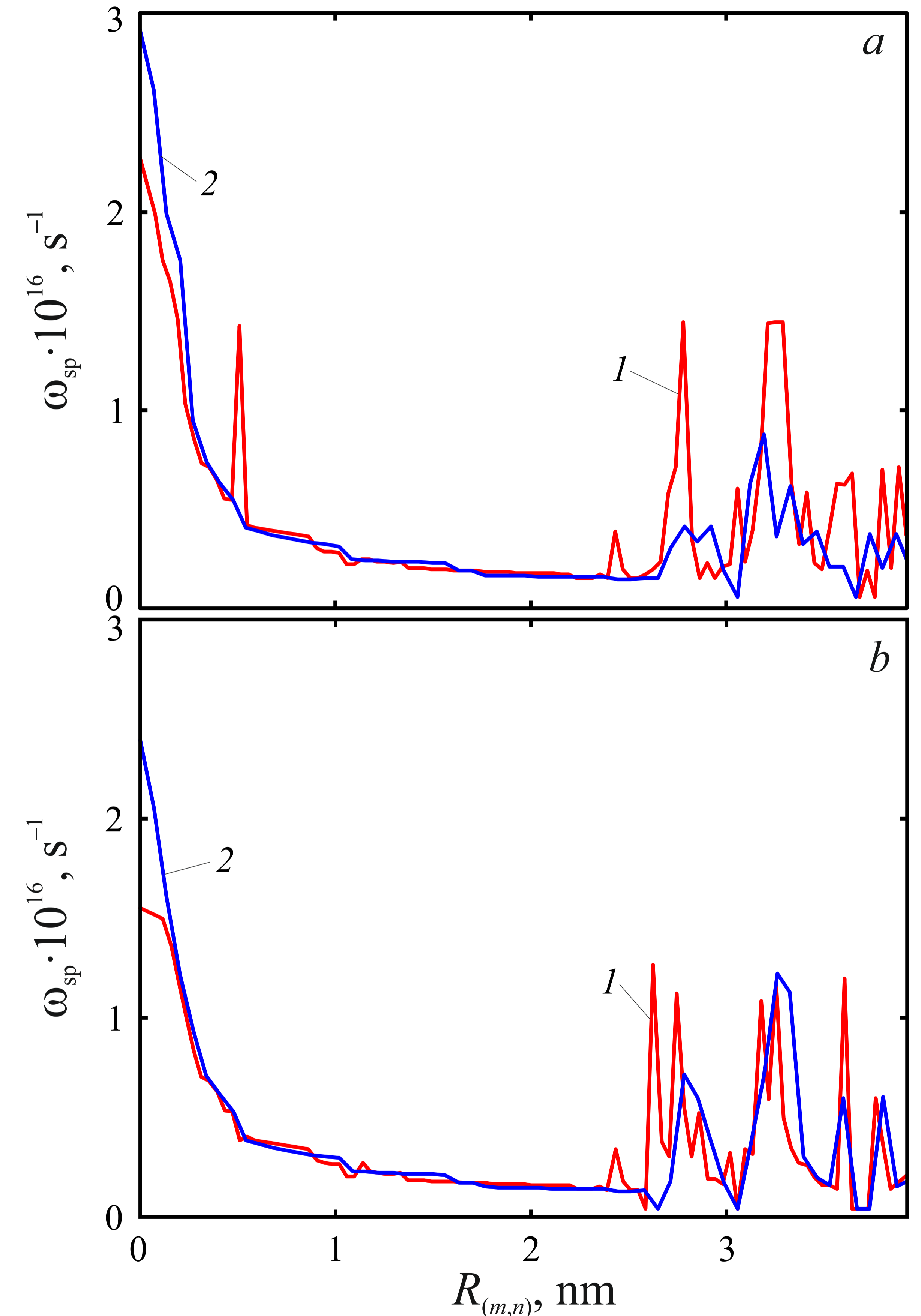


Fig. 1. Dimensional dependences of the SPR frequency for CNTs of the "zigzag" (a) and "armchair" (b) type