

Computer Graphics Techniques in CAD Applications

Vladimir Galaktionov

Keldysh Institute of Applied Mathematics Russian Academy of sciences
Moscow, Russia

Abstract

The talk is devoted to different applications of physically accurate simulation of light propagation. Initially efforts were concentrated on visualization of exterior and interior architecture design. The ray tracing technology based on the Monte Carlo approach was elaborated which provided accurate calculations of lighting in real scenes and rendering of images of photorealistic quality. The technology proved to be highly efficient that allowed applying it to simulation of luminaries, car headlights and optical light guiding systems like PLED. The systems of this kind have complicated internal structure including surfaces with complex microrelief where light undergoes billions of interreflections. Practical usability of optical simulation in such applications requires very high accuracy of results. Further elaboration is related with simulation and visualization of materials with complex optical properties like multilayer paint coatings with complex internal microstructure, volume scattering. Newest challenging areas of research which reflect expectations of industry accommodate simulation of light propagation in a media with high concentration of particles (e.g. ink).