Surface roughness has a huge impact on many phenomena in tribology. In this talk I present an efficient numerical method to study the non-adhesive, frictionless, normal contact between an elastic half-space and a rigid, self-affine fractal surface. A Conjugate Gradient Method (CGM) is applied to solve a set of linear equation for unknown normal stresses. In each iteration of the CGM, a Fourier accelerated summation scheme was used. A parallel code was implemented for a Shared Memory Supercomputer, and simulations with up to 4096 times 4096 grid points were run in reasonable time (about one hour). I will compare the numerical results with a recently derived multiscale contact theory (Persson BNJ, 2001. J. Chem. Phys. 115, 3810). The simulations show that the results are only accurate enough for not too rough surfaces and that there are still some statistical fluctuations, which prevent a detailed comparison with the multiscale contact theory.