

# The Problem of Covering Solids By Spheres of Different Radii

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In this work, we present a mathematical programming model for the problem of covering solids by spheres of different radii. Given a set of spheres, possibly with different diameters, and a solid, the goal is to locate the spheres in such a way their union forms a coverage for this solid, using the smallest possible number of spheres of this set. This problem has an application in the radiosurgical treatment planning known as Gamma Knife and can be formulated as a nonconvex optimization problem with quadratic constraints and a linear objective function. We also present an heuristic in order to find good solutions in reasonable times.

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