DIFFERENTIABILITY OF THE POISSON-BOOLEAN PERCOLATION PROBABILITY

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Consider a Boolean model consisting of balls of radius distribution F centred on Poisson points of intensity λ in $\mathbb{R}^d$, with $d \geq 2$ fixed. Denote by θ the covered volume fraction of the infinite cluster, also known as the percolation probability. We discuss the differentiability of θ as a function of λ, or more generally as a function of the measure λF, in the supercritical phase. We also describe a result stating that $\theta(\lambda)$ grows at least linearly just above the critical value of λ. An interesting feature of the proof is that it uses the continuum Reimer inequality. We shall also discuss similar results for the *capacity functional* of the infinite cluster; this is the set function mapping each $A \subset \mathbb{R}^d$ to the probability that A intersects with the infinite cluster. This is joint work with Günter Last and Sergei Zuyev.