# CONJECTURALLY OPTIMAL COVERINGS OF AN EQUILATERAL TRIANGLE WITH UP TO 36 EQUAL CIRCLES

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ABSTRACT. This paper presents a computational method to find good, conjecturally optimal coverings of an equilateral triangle with up to 36 equal circles. The algorithm consists of two nested levels: on the inner level the uncovered area of the triangle is minimized by a local optimization routine while the radius of the circles is kept constant. The radius is adapted on the outer level to find a locally optimal covering. Good coverings are obtained by applying the algorithm repeatedly to random initial configurations.

The structures of the coverings are determined and the coordinates of each circle are calculated with high precision using a mathematical model for an idealized physical structure consisting of tensioned bars and frictionless pin joints. Best found coverings of an equilateral triangle with up to 36 circles are displayed, 19 of which are either new or improve on earlier published coverings.