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Mechanically Stable Packings of Spherocylinders[1] TIMOTHY GREEN , SCOTT FRANKLIN, RIT — Piles of long, thin rods are substantially more stable to perturbations than those of ordinary sand or rice. We generate 3d mechanically stable packings of spherocylinders by alternately enlarging particles (with an elastic repulsive interaction) and using a conjugate gradient minimization of the total elastic energy. The minimum stable packing ϕ_c is defined as the least dense packing for which the minimum energy is non-zero, and we investigate the average contact number, the spectrum of vibrational modes in the dynamical matrix, and other properties of this critical packing. We also test whether spherocylinders obey the isostatic conjecture, which states that the average contact number at ϕ_c is twice the number of degrees of freedom (for spherocylinders, 5). Spherocylinders' straight edges, compared with the convex sides of ellipsoids, puts the isostatic conjecture in jeopardy, perhaps requiring a greater number of contacts to maintain stability.

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