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Simulation of Planetary Formation using Python JAMES BUFKIN,
DAVID BIXLER, Angelo State university — A program to simulate planetary for-
mation was developed in the Python programming language. The program consists
of randomly placed and massed bodies surrounding a central massive object in order
to approximate a protoplanetary disk. The orbits of these bodies are time-stepped,
with accelerations, velocities and new positions calculated in each step. Bodies are
allowed to merge if their disks intersect. Numerous parameters (orbital distance,
masses, number of particles, etc.) were varied in order to optimize the program.
The program uses an iterative difference equation approach to solve the equations
of motion using a kinematic model. Conservation of energy and angular momen-
tum are not specifically forced, but conservation of momentum is forced during the
merging of bodies. The initial program was created in Visual Python (VPython) but
the current intention is to allow for higher particle count and faster processing by
utilizing PyOpenCl and PyOpenGl. Current results and progress will be reported.

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