132th MSS-Seminar
Wednesday, November 27th,
15:30 hrs, Seminarraum (00.156),
Cauerstraße 3, Erlangen.

Distribution size of a broken asteroid – challenging fragments trajectories

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A real threat to our planet Earth can be caused by a subclass of the Near-Earth-Objects (NEOs) known as PHAs (Potentially Hazardous Objects). Since an object is attracted during the intersection of its orbit with the Earth, it may cause damage of continental magnitude. An asteroid impact on Earth could be catastrophic if the event brings together factors culminating in enough energy to cause significant damage. If one remembers the Shoemaker-Levy disruption, we may say we were lucky that it happened around Jupiter, because the consequences after its fragmentation might be taken as the picture of what an uncontrolled fragmentation could bring if happened around Earth. One possible action of planetary defense for potentially hazard asteroid near Earth would be maneuvering the object using space tethers, which depends on the type of material. Another action to avoid the hazard body would to explode it. Considering that the object does not have enough strength to support the stress due to the attachment of the tether, and taking an explosion as a valid alternative, the question raised is what may happen after the asteroid breakage. The answer may imply in two questions beforehand: what fragments size the object would turns out and which trajectories would these fragments assume. The answers are important to evaluate the danger we can go through.
The idea is to “re-build” an asteroid using the appropriated size distribution and simulate different energies for breaking up one real case. The investigation of the appropriated size-distribution has been done considering 119 families of asteroid. Once the distribution was defined, we used a Modified Ballistic Particle Cluster Aggregate to set the fragmented asteroid. We are still introducing modifications on the BPCA model to create a spheroidal shape to result in a given density. This has to be done before we attribute dispersion velocities to each fragment. This will allow us to study the trajectories described by those fragments. The next stage will be to analyze different energy inputs for the fragmentation.