C Videos

Several videos are also part of the electronic attachment of the thesis. Here we present their description. Information on details of the simulation process can be found in Sect. 15. The videos can be also downloaded at: galaxy.asu.cas.cz/∼ivaana/phd

1. 1-shells.avi – Video from a simulation of a shell-producing radial minor merger from a perspective perpendicular to the axis of the merger. The bottom three panels show an area of 60×60 kpc centered on the primary which is the zoomed part of the upper panels of size 300×300 kpc. The first column shows the surface density of both the primary and the secondary galaxy, the second only the surface density of the particles originally belonging to the secondary galaxy (corresponding to the host galaxy subtraction, a technique used in processing real galaxy images). The third column shows the surface density of particles originally belonging to the secondary galaxy divided by the surface density of the primary galaxy (also corresponding to an observational technique). The parameters of the merger are the following: the mass of the primary is $3 \times 10^{11}\,\mathrm{M}_\odot$, the secondary-to-primary mass ratio is 0.02, the Plummer radius of the primary is 7.6 kpc, of the secondary 0.76 kpc. The initial relative velocity of the galaxies was equal to the escape velocity of the secondary and the separation of their centers was 90 kpc. When the centers of the galaxies pass through each other, the potential of the secondary is suddenly switched off.

2. 2-shells.mpg – Video from a simulation of a shell-producing radial minor merger used in Sect. 13. The top panel (300×300 kpc centered on primary) shows the surface density of the particles originally belonging to the secondary galaxy from a perspective perpendicular to the axis of the merger; the bottom panel shows the density of the particles originally belonging to the secondary in the space of radial velocity (vertical axis) versus galactocentric distance (horizontal axis). The potential of the host galaxy is the same as the one described in Sect. 8. Primary is modeled as a double Plummer sphere with respective masses $M_* = 2 \times 10^{11}\,\mathrm{M}_\odot$ and $M_{\mathrm{DM}} = 1.2 \times 10^{13}\,\mathrm{M}_\odot$, and Plummer radii $\varepsilon_* = 5$ kpc and $\varepsilon_{\mathrm{DM}} = 100$ kpc for the luminous component and the dark halo, respectively. The potential of the cannibalized galaxy is chosen to be a single Plummer sphere with the total mass $M = 2 \times 10^{10}\,\mathrm{M}_\odot$ and Plummer radius $\varepsilon_* = 2$ kpc. The cannibalized galaxy is released from rest at a distance of 100 kpc from the center of the host galaxy. When it reaches the center of the host galaxy in 306.4 Myr, its potential is switched off and its particles begin to oscillate freely in the host galaxy.

3. 3-projection.mpg – Video shoes the simulation from point 2 (used in Sect. 13) at the time 2.2 Gyr after the decay of the cannibalized galaxy (2.5 Gyr of the simulation time) from different perspectives. Angle of 0 degrees corresponds to the perspective perpendicular to the axis of the merger.

4. 4-friction.avi – Surface density of the particles originally belonging to the secondary galaxy from two simulation of radial minor merger from Sect. 21.1 (run 1 – right panels and run 2 – left panels). The first column corresponds to the simulation with dynamical friction and gradual decay of the secondary; the other corresponds to the simulation without friction and with the instant disruption of the secondary near the center of the primary galaxy. The bottom panels show an area of 60×60 kpc centered

on the primary which is the zoomed part of the upper panels of size 300×300 kpc. The video covers 8 Gyr since the release of the secondary galaxy from distance of 180 kpc from the center of the primary with the escape velocity. Both simulations were executed for the the standard set of parameters (Sect. 15.5): the mass of the primary is $3.2 \times 10^{11}\,\mathrm{M}_\odot$, the secondary-to-primary mass ratio is 0.02, the Plummer radius of the primary is 20 kpc, of the secondary 2 kpc.

5. 5-selfconsistent.avi – Video from self-consistent simulation of a radial minor merger from Sect. 21.3. The bottom panel (400×400 kpc centered on primary) shows the surface density of the particles originally belonging to the secondary galaxy from a perspective perpendicular to the axis of the merger; the top panel shows the density of the particles originally belonging to the secondary in the space of radial velocity (vertical axis) versus galactocentric distance (horizontal axis). The potential of the primary galaxy is a double Plummer sphere with respective masses $M_* = 2 \times 10^{11}\,\mathrm{M}_\odot$ and $M_{\mathrm{DM}} = 8 \times 10^{12}\,\mathrm{M}_\odot$, and Plummer radii $\varepsilon_* = 8$ kpc and $\varepsilon_{\mathrm{DM}} = 20$ kpc for the luminous component and the dark halo, respectively. The potential of the secondary galaxy is chosen to be a single Plummer sphere with the total mass $M = 2 \times 10^{10}\,\mathrm{M}_\odot$ and Plummer radius $\varepsilon_* = 2$ kpc. The cannibalized galaxy is released from the distance of 200 kpc from the center of the host galaxy with the initial velocity 102 km/s.

Videos 2–4 were made from simulated data by Miroslav Křížek.