BINARIES FROM UNSTABLE TRIPLES. DYNAMICAL PROCESSES OF FORMATION

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The dynamical processes of formation, evolution and disruption of binaries may be effectively studied by computer simulations in the N > 3-body gravitational problem. As a result of analysis of these investigations of diverse authors, the classification of the dynamical processes of formation of wide and close binaries may be proposed (see Table 1). This Table shows the following general processes: I-triple approaches of the single bodies; II-approaches of binaries with single bodies; III-escape from physical triples. The actions of these processes, and kinetics of a frequency of binaries in general field were studied at the Astronomical Observatory of the Leningrad State University (1965-1988) by computer simulations in the three-body problem. More than 3.10^4 orbits with negative total energy E < 0 and 5.10^4 with E > 0 have been run on the computers. The film "Dynamical evolution of triple systems" was produced. Part I of this movie shows the evolution of the unstable non-hierarchical triplet as well as the processes of formation, evolution, and disruption of temporary wide and final close binaries inside the physical triples. Part II of film presents in detail the trajectories of the bodies on the triple approaches of "fly-by" - and of "exchange"-types. The triple approach of "fly-by"-type results often in an escape from triple as well as the formation of final close binary. The triple approach of "exchange"-type consists as a rule of a few close double approaches of bodies and rarely results in an escape from triplet, it results in formation of temporary wide binary inside triplet. Part III of movie presents the trajectories of the different-mass bodies: an escape of the minimum-mass body, the intermediate-mass body, and the maximum-mass body as well as a formation of binaries with different-mass components.

[In Dr Anosova's absence, the film was introduced and presented by Dr R S Harrington, US Naval Observatory.]

REFERENCES:

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TABLE 1. Processes of formation of wide and hard binaries. E is the total energy of the triplet, E* the energy of the closest bodies.