Movies
Produced by LSU's Astrophysics Theory Group

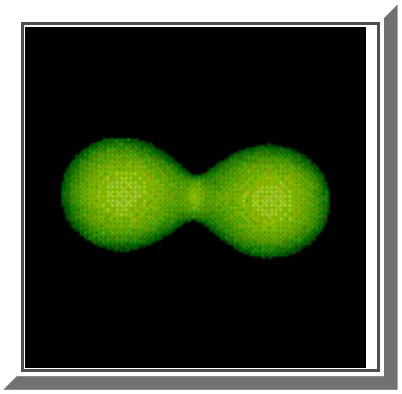
Department of Physics & Astronomy
Louisiana State University

NOTE: One frame from the "Binary Merger" movie shown below has been featured on the cover of the 1998 July/August issue of *Computers in Physics* (now *Computing in Science and Engineering*) and a sequence of images from the movie have been published in that issue's *Internet Goldmine* article.

The Relative Stability of Close, Equal-Mass Binaries
[1995 - 1997]

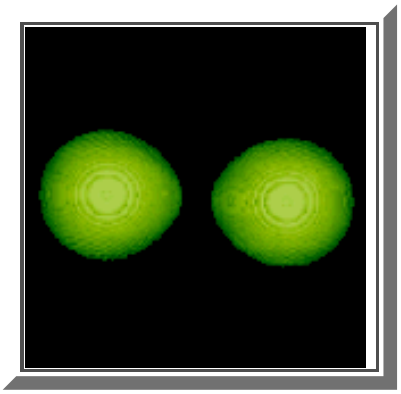
We have published the results of an extensive study of the stability of close, equal-mass binary star systems that exhibit different degrees of gas compressibility (New and Tohline 1997; see also, New 1996). Two animation sequences illustrating the results of this investigation are shown here. The animation referred to as "Stable Binary" follows a binary system through approximately four full orbits in a frame of reference that is rotating with the initial orbital frequency. It illustrates clearly that even a common-envelope binary system can be dynamically stable against merger. The other animation -- labeled, "Binary Merger" -- illustrates how an evolution proceeds in a system with a stiff equation of state that is unstable toward merger. A principal conclusion of the New and Tohline 1997 investigation is that close binary stars with "stiff" (almost incompressible) equations of state are unstable to merger whereas binary stars with soft equations of state -- such as would arise in binary protostellar systems -- are stable against merger.

Stable Binary



Quicktime (1,380K)

Binary Merger



mpeg (701K)

References

- New, K.C.B. (1996), *Instabilities in and Gravitational Radiation from Compact Stars and Compact*

Binary Systems, Ph.D. Dissertation, Louisiana State University
- New, K.B.C. and Tohline, J.E. (1997), The Astrophysical Journal, **490**, p. 311

Producer	***Visualization Directors***	***Scientific Director***
Joel E. Tohline	John E. Cazes Howard S. Cohl	Kimberly C. B. New

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