Radar images of ten binary near-Earth asteroids

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We report Goldstone (8560 MHz, 3.5 cm) and Arecibo (2380 MHz, 13 cm) delay-Doppler radar observations of binary near-Earth asteroids (NEAs) (1862) Apollo, (65803) Didymos, (66063) 1998 RO1, (85938) 1999 DJ4, 1990 OS, 1994 XD, 1998 ST27, 2005 AB, 2006 VV2, and 2007 DT103. Of these, several are suitable for shape and orbit estimation, at least two have secondaries that are rotating more rapidly than their orbital periods, one is an M-type, some primaries have irregular shapes, and one system has the largest relative semimajor axis, eccentricity, and most dynamic orbit seen to date. Since completion of the Arecibo upgrade in 1999, 75% (18/24) of binary NEA discoveries have been by radar. 47% (14/30) have been discovered at Arecibo, 13% (4/30) at Goldstone, and four objects discovered photometrically have been detected, so that 92% (22/24) of binary NEAs found since 1999 have been observed by radar. Radar has become the "primary" technique for binary NEA discovery and characterization. This talk will discuss what we can learn from radar observations of each object with an emphasis on 2006 VV2 and 1998 ST27, the two systems with the most outstanding properties.