APPENDIX A

HUMP ZOOLOGY IN CATACLYSMIC VARIABLES

Type	Meaning	Example Stars	Alleged Origin
1. Orbital Hump	Signal at the orbital frequency ω_o in quiescence.	U Gem WZ Sge	Presentation effect of hot spot (stream–disk impact region).
2. Outburst Orbital Hump	Signal at or very near ω_o in outburst. Quite rare; appears to be transiently present in a few SU UMa stars (possibly restricted to the WZ Sge class) in the earliest stage of outburst. Sometimes also called early, immature, and orbital superhumps; but we prefer to restrict "superhump" to cases where the frequency is distinct from ω_o.	WZ Sge AL Com	Unknown.
3. Common Superhump	Signal at ω_o–Ω, shown by all SU UMa stars in outburst; decays roughly on a timescale of 1–3 weeks. Often of very large amplitude (0.4 mag), and thus a major element in the outburst energy budget. So universal and so extensively studied that "superhump", *sans* qualifier, often implies a common superhump.	SU UMa VW Hyi 54 others	Periodic tidal disturbance of the disk by the orbiting secondary (thus requiring a slow apsidal advance to match the frequency shift to ω_o– Ω).
4. Late Superhump	Signal at ω_o–Ω, sometimes following (3) and basically defined by a sudden phase shift in (3) of ~0.5 cycles, with little or no change in period.	OY Car VW Hyi	Not securely known, but definitely similar to (3) — features apsidal advance of an "elliptical" disk.
5. Positive Superhump	A general term for any signal with P slightly exceeding P_o (a small positive increment in period) and hence $\omega=\omega_o$–Ω. Includes all common superhumps.	77 CVs	Just an observational term.
6. Apsidal Superhump	Alternate to (5), if you subscribe to the theory that (5) arises from apsidal advance ("precession") of the disk, in which case Ω is the precession frequency. Includes all common superhumps, if you buy that theory.	77 CVs, probably	Probably same as (3) or (4).
7. Negative Superhump	A general term for any signal with P slightly less than P_o (a small negative increment in period) and hence $\omega=\omega_o+N$.	V503 Cyg TV Col V603 Aql	Just an observational term.
8. Nodal Superhump	Alternate to (7), if you subscribe to the theory that (7) arises from nodal precession (wobble) of the disk, in which case N is the precession frequency.	same, probably	Not securely known.
9. Permanent Superhump	Any positive or negative superhump which is long-lived (months or longer) and not associated with eruption.	AM CVn V603 Aql BK Lyn	Probably same as (3), (4), and (8).
10. Quiescent Superhump	Extremely rare, and not a term in general use. A superhump in states of very low luminosity, with no connection yet established to the other superhump types.	AL Com CP Eri	Unknown.
11. Superhumper	A star which engages in superhumps.		

NOTES. —

(a) "Outburst" here means *superoutburst*. Happily, we still know of no related periodic signals characteristic of normal outburst.

(b) It may well be true that all apsidal precession is prograde (giving a positive superhump) and all nodal precession is retrograde (giving a negative superhump). The limited data available now are consistent with this. If counterexamples are found, these definitions would be affected somewhat.

(c) Superhumps can be characterized by 3 fundamental frequencies (ω_o, Ω, N), and the dominant signal is nearly always ω_o–Ω or ω_o+N. But studies of high sensitivity and frequency resolution often reveal components with $\omega=n\omega_o-m\Omega$ (where n=any small integer and m=1, 2, ..., n) or $n\omega_o+N$ (same terminology). We consider these as "fine structure" and thus outside this classification effort.