compared to Sharp and having several sign errors. However, by allowing the front mass to be zero his equations are nearly correct.

Adiele refers to Roland [1971], but does not compare equations. A subsequently published paper by Taylor and Adiele [1980] on stability in large angle steady turns also appears to rely on Adiele's equations, even though the authors evidently knew of earlier linearized studies (by Weir, and others) **which** they could have used to check their equations.

Lowell and Mckell, 1982

In 1982 Lowell and Mckell, using ad hoc arguments similar in style to Pearsall [1922] derive a set of linearized equations for a Basic bicycle model with a point mass in the **rear** part, some steering inertia and front gyroscopic effects, but no front mass, and no tilt of the steering axis. When compared to **our** equations simplified for this case, we find there is significant disagreement. Several terms have been neglected in both the lean and steer equation, however, the terms which are presented are correct. The neglected terms are significant, as a bicycle with vertical steering axis and positive trail *should* return upright if speed is great enough ($E > 0$), and show ever-increasing lean if speed is below a critical value ($E < 0$).[7] However their approximations make $E = 0$ always, so their bicycle model neither straightens up nor leans further, **but** in fact oscillates about a steady turn.

[7] For this simple bicycle E varies exactly opposite to E for a standard bicycle. When it is positive at low speeds and negative at high speeds.

We find the only way to make their equations correct is to use them for a bicycle with zero gyroscopic effects and zero trail.

Lowell and McKell refer to Timoshenko and Young [1948], Gray [1918], and Pearsall [1922] but only state (correctly) that their lean equation agrees with Timoshenko's when simplified. They made no other comparisons.

Conclusions

Of the 20 sets of equations discussed in this chapter only **3** sets (Döhring [1955], Singh and Goel's [1971] adaptation of these, and Weir [1972]) agreed exactly with those we presented in Chapter III of this thesis. (The slip angle condition had to be set to zero in Weir's equations.) Five others simply had minor errors, or were not **as** general (Whipple [1899], Carvallo [1901], Sommerfeld and Klein [1903], Timoshenko and Young [1948], and Sharp [1971]). Three (Collins [1963], Singh [1964], and Roland [1972]) were to difficult too evaluate, though we have definite reservations about the first two. The remaining eight were missing terms, or disagreed in other ways (we did not check Singh and Goel [1975]).

Other works which derived linearized equations of motion, but whose comparison results are not presented here, are Eaton [1973] and Psiaki [1979]. Eaton's derivation was not noticed until late in this thesis's progress. Psiaki derived very dense **nonlinear** equations and then linearized rather formally; we did not expend the effort to **sort** out his notation. Guo [1979] performed a nonlinear analyses but did **not** linearize, so we did not compare to his equations. Psiaki stated he found numerical agreement with Collins, and Guo referred to Neĭmark and Fufaev but