5.4 Self-Levelling Suspension

5.4.1 Foreword

Self-levelling suspension mechanisms take and keep possession of first place among the various potentials to further enhance a vehicle chassis that has already been fine tuned by design and is in manufacture.

Such mechanisms are most indispensable for automotive vehicles of the low- and/or medium-mass category seeing that here the ratio of probable supplementary loading in opposition to normal vehicle mass is unpredictably relatively high.

A self-levelling suspension mechatronic control system combines the passive spring element found in a passive suspension with a shock absorber (damper) element whose characteristics may be adjusted by the driver.

As shown in Figure 5.25 the drivers may use a selector device to set the desired level of absorbing (damping) based on their objective feel [BARAK 1989].

This mechatronic control system has the advantage of allowing the driver to occasionally adjust the shock absorbers according to the on/off road surface characteristics. It is however, unrealistic to expect the driver to adjust the self-levelling suspension mechatronic control system to respond to time inputs such as potholes, turns, or other common on/off road surface inputs.

In some circumstances, self-levelling suspension mechanisms are already technologically advanced.

Fig. 5.25 Self-levelling suspension mechatronic control system [BARAK 1989].
They contain for the most part conventional F-P-M or only P-M components set up parallel to the standard suspension spring that holds up the vehicle body.

Thus the normal spring travel is preserved even at increased static loads, in view of which, softer springs that enhance comfort contrasted to the standard suspension can be used.

An attractive and comparatively low-cost design variant of the vibration shock absorber (damper) with self-pumping levelling feature is shown in Figure 5.26 [SEIFFERT AND WALZER 1991].

This damper does not necessitate an independently driven M-F pump; the necessary oily-fluid pressure develops by itself as the vehicle’s body moves up and down. But not many preliminary actions are effective enough to attain this on their own. [SEIFFERT AND WALZER 1991].