Coupled springs

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Solution: *Springs are arbitrarily compressible, i.e.,* $F_n = -k_n a_n$. *Following the scheme, both the mass* m *and the connecting plate between the springs are in equilibrium, that is,* $F_{34} = F_2 = F_1$. *Since the springs* k_3 *e* k_4 *are mounted in parallel, their total spring constant is additive. Hence we have* $(k_3+k_4)a_3 = k_2 a_2 = k_1 a_1$. *Using the condition that the sum of the individual displacements of the spring is* $a_1+a_2+a_3 = L$, *we obtain:*

$$a_1 = \frac{L}{1 + k_1/k_2 + k_1/(k_3 + k_4)} \ .$$