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# Quantifying the effect of dense layers on fieldline footpoint motions

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Our aim is to investigate the validity of the line-tied approximation used in modeling the reaction of solar coronal magnetic structures to photospheric movements. We integrate the time-dependent compressible 1.5 D MHD equations with transparent boundary conditions. The atmosphere is in hydrostatic equilibrium, and includes a model chromospheric transition. We give a 100m/s speed to the left footpoint only, and examine what happens to the other footpoint. We expect the dense layers to achieve line-tied-like conditions, when the loop is large enough. However, we find that all loops with lengths ranging from 2Mm to 25 Mm behave in the same way: the speed difference between both footpoints, instead of remaining constant, decrease exponentially, the time scale being of the order of 20 Alfvén times, the Alfvén time being the travel time to cross the loop, based on the photospheric Alfvén speed (here 670m/s). This universal behaviour is explained as follows: the Alfvén wave propagates the transverse momentum from the left footpoint to the apex in an Alfvén time; this forms a standing wave trapped in the upper atmosphere which leaks progressively: during the leakage process, the right footpoint gains progressively the same momentum as the left footpoint.