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# Simulations of turbulent loops and open regions: heating and cooling

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**Abstract.** We model both the heating (anisotropic turbulence driven by Alfvén waves) and the cooling processes (convection, conduction, and radiation based on atomic physics) in a coronal loop. The heating is intermittent and sufficient to heat the loop at temperatures of more than a million degrees, with realistic values of the amplitude of the forcing (corresponding to motions of the photospheric footpoints of the loop). We show that including the feedback of the cooling on the heating processes is important in such models. We forward-model the spectral line profiles of the emission of this loop in several UV lines and their time evolution, in order to be able to find signatures of heating processes in observations such as those of Hinode/EIS and XRT. Finally, we discuss the origins of the limitations we have found in this model, in particular the difficulty to produce very hot plasma, and how to possibly overcome them.
The heating part of the model is also used to simulate the nonlinear propagation of waves, turbulence, and heating in the solar wind.