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Plasma instabilities and dynamics of quiescent prominences: observation and theory

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Abstract. We present the results of the observations of several quiescent prominences taken with the SOT instrument on Hinode. We find a number of processes occurring at different stages of the prominence evolution that are common for all the chosen cases and, having universal character, can be related to fundamental instabilities of magnetized plasma. We combine the observational evidence and theoretical estimates to identify these instabilities. The following can be given as examples. (1) An analogue of the Kelvin-Helmholtz instability develops at the prominence/corona interface that manifests itself in growing ripples during a linear growth phase and may be followed by a nonlinear stage taking the form of an explosive instability corresponding to a CME ejection. This instability also includes the regime of a smoke ring formation. (2) The appearence of bubbles and spikes typical to the Rayleigh-Taylor instability are observed. Their evolution and growth rates are found to be modified by both, poloidal and toroidal components of magnetic field. (3) Resistive interchange instability associated with an unfavorable magnetic field curvature relative to the density/temperature gradients may be responsible for a hot barb formation, its evolution and collapse.