

# Generic equations for pattern formation in evolving interfaces

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## Abstract-

We present a general formalism which allows us to derive the evolution equations describing one-dimensional (1D) and isotropic 2D interface-like systems, that is based on symmetries, conservation laws, multiple scale arguments, and exploits the relevance of coarsening dynamics. Our approach becomes especially significant in the presence of surface morphological instabilities and allows us to classify the most relevant nonlinear terms in the continuum description of these systems. The formalism applies to systems ranging from eroded nanostructures to macroscopic pattern formation. In particular, we show the validity of the theory for novel experiments on ion plasma erosion.

**Index Terms-** nonlinear evolution, crystal-growth, surfaces, instabilities, films, model

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