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Nonlinear ripple dynamics on amorphous surfaces patterned by ion beam sputtering

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Abstract-

Erosion by ion-beam sputtering (IBS) of amorphous targets at off-normal incidence frequently produces a (nanometric) rippled surface pattern, strongly resembling macroscopic ripples on aeolian sand dunes. A suitable generalization of continuum descriptions of the latter allows us to describe theoretically for the first time the main nonlinear features of ripple dynamics by IBS, namely, wavelength coarsening and nonuniform translation velocity, that agree with similar results in experiments and discrete models. These properties are seen to be the anisotropic counterparts of in-plane ordering and (interrupted) pattern coarsening in IBS experiments on rotating substrates and at normal incidence.

Index Terms- aeolian sand ripples, thin-film growth, instabilities, bombardment, morphology, equation, erosion, model

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