

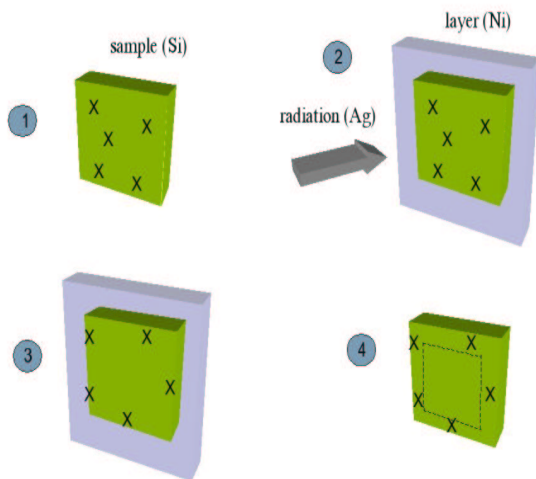
**NATO-LOCNET ADVANCED RESEARCH WORKSHOP  
INTRINSIC LOCALIZED MODES AND DISCRETE  
BREATHERS IN NONLINEAR LATTICES**  
*Erice-Sicily: July 21-27, 2003*

**Interaction of moving breathers with vacancies**

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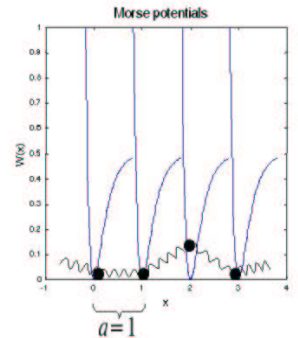
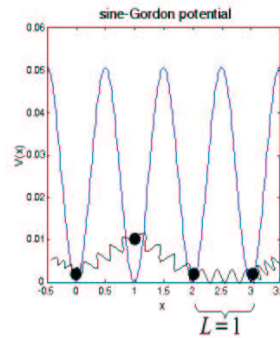
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**Frenkel-Kontorova + anharmonic interaction**

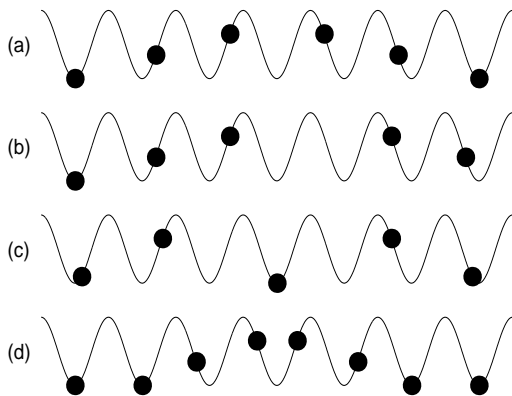
$$V(x) = \frac{L^2}{4\pi^2} \left[ 1 - \cos\left(\frac{2\pi x}{L}\right) \right]$$

$$W(x) = \frac{1}{2} \left[ \exp(-b(x-a)) - 1 \right]^2$$



**Experimental evidence**

**The model**



(a) is a single vacancy;

(b) are two adjacent vacancies;

(c) are two disjoint vacancies;

(d) is an interstitial.

**Defects modelling**

## Single vacancy

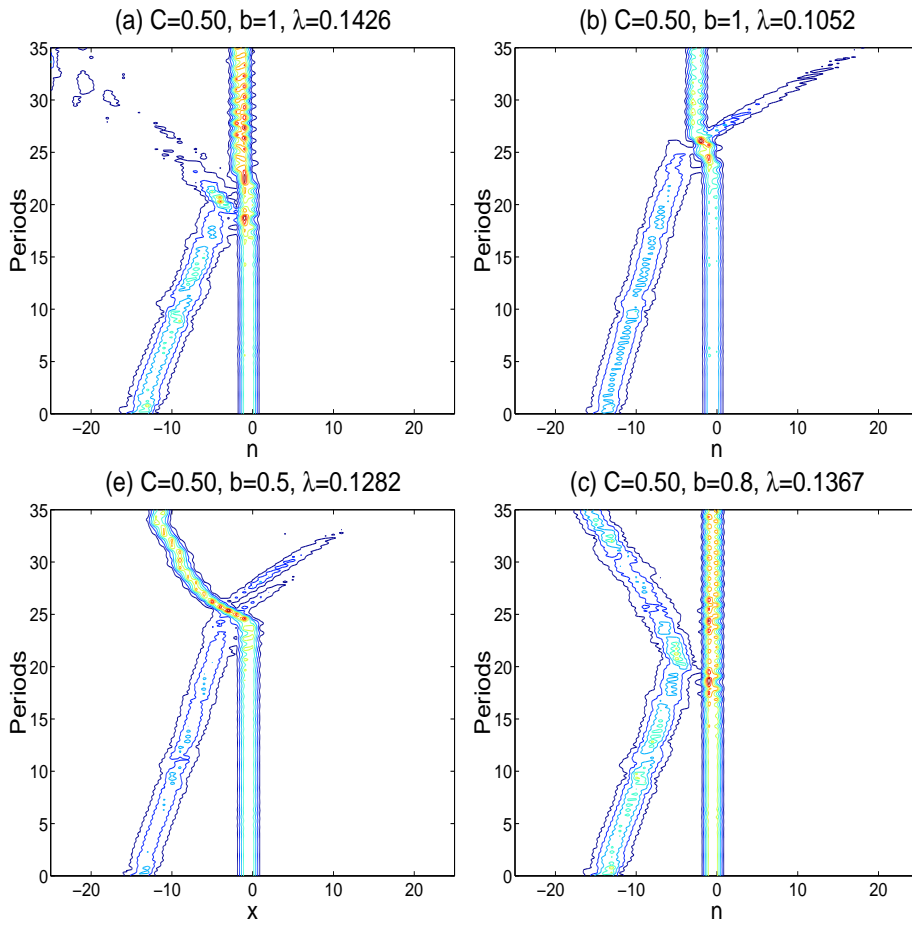


Fig 1: Energy density for the particles in the interaction moving breather–vacancy.

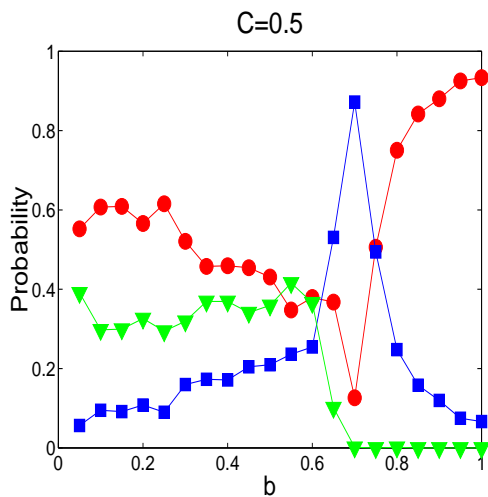


Fig 2: Probability that the vacancy remains at its site (squares), moves backwards (circles), and moves forwards (triangles), for  $C = 0.5$ .

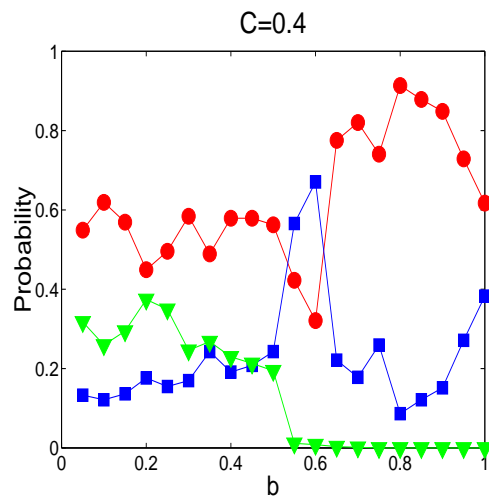


Fig 3: Probability that the vacancy remains at its site (squares), moves backwards (circles), and moves forwards (triangles), for  $C = 0.4$ .