SOFTWARE CODES

NUMERICAL CODE FOR THE STABILITY DIAGRAMS

A numerical code for the evaluation of the stability diagrams shown in the main text was written using the software Matlab.

function beta = beta_p(a, p, q)

```
n = 3;
h = 10;

d = 2 * h + 2 * (n - 2) + 5;
r = (d - 1) /2;

A = eye(d) - q.* diag(1./(a - (2 * (-r : r - 1)).^2), 1) - q. * diag(1./(a - (2 * (-r + 1 : r)).^2),-1)  -p.* diag(1./(a - (2 * (-r : r - n)).^2), n) - p.* diag(1./(a - (2 * (-r + n : r)).^2),-n);

detA = det(A);

if (mod(sqrt(abs(a)), 2) == 0)

beta=1/pi*acos(2*det(eye(d)-q.*diag(1./(a-(1+2*(-r:r-1)).^2),1)-q.*diag(1./(a-(1+2*(-r+1 : r)).^2),-1)-p.*diag(1./(a-(1+2*(-r : r-n)).^2), n)-p.* diag(1./(a-(1+2 * (-r+n : r)).^2),-n))-1);

else
```

```
beta = 2/ pi * asin(sqrt(detA * (sin(pi /2.* sqrt(a))^2)));
end
end

x = [0 : 0:05 : 50];%arange
y = [0 : 0:05 : 25];%qrange

forh = 1 : length(x)
forj = 1 : length(y)

mat(j, h) = beta_p(x(h), 0, y(j));

end
end

[X, Y] = meshgrid(y, x);
figure;

[C, r] = contour(X, Y, real(mat'),'k');

w = r.LevelList;
r.LevelList = [1, 0.001];

holdon
```