Asymmetry random geometric dynamic landscapes (CJ Melian)

May 22, 2017

In [ ]:
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%------------------------------------------------------------------------
%Run migration events in random geometric graphs and dynamic landscapes
%Melian@KB May 2017
%------------------------------------------------------------------------
for ri = 1:50;
    S = 20;J = 100;%S sites and J inds. per site
    R = ones(S,J);
    countgen = 0;
    Pairs = zeros(1,2);cevents = 0;
for k = 1:100;
        A = 100;%amplitude, is the peak deviation:
        %350 to match simulations in random landscapes
        f = 0.1;%ordinary frequency, number of
        %cycles that occur each second of time
        sig = 0;%the phase
        countgen = countgen + 1;
        r = A*sin(2*pi*f*countgen + sig) + A;%starting point with r approx.
        %A and countgen is generation season

        D = zeros(S,S);%theshold matrix
        Di = zeros(S,S);%distance matrix
        mu = S*(exp((-pi * (r/1000)^2 * S)));%site connectivity
        n = unifrnd(0,1000,S,2);

        for i = 1:S-1;
            for j = i+1:S;
                A = (n(i,1) - n(j,1))^2;%Euclidean distance
                B = (n(i,2) - n(j,2))^2;
                d(i,j) = sqrt(A + B);
                Di(i,j) = 1/d(i,j);
                if d(i,j) < r;%threshold
                   D(i,j) = 1;
                else
                   D(i,j) = 0;
                end
           end
```

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                end
                DI=Di+Di';Dc=cumsum(DI,2);D1=D+D';

                for j = 1:J*S;
                    KillHab = unidrnd(S);
                    KillInd = unidrnd(J);
                    MigrantHab = unifrnd(0,max(Dc(KillHab,:)));
                    Hab = find(Dc(KillHab,:) >= MigrantHab);
                    %pause
                    if D1(KillHab,Hab(1,1)) == 1;
                       MigrantInd = unidrnd(J);
                       cevents = cevents + 1;
                       Pairs(cevents,1) = KillHab;
                       Pairs(cevents,2) = Hab(1,1);
                      break
                    end

                end
         end
        end
        fid = fopen('Asymmetry.txt','a');fprintf(fid,
        [repmat('% 6f',1,size(Pairs,2)), '\n'],Pairs);fclose(fid);
```

In [11]:
```
A = dlmread('Asymmetry.txt');
```

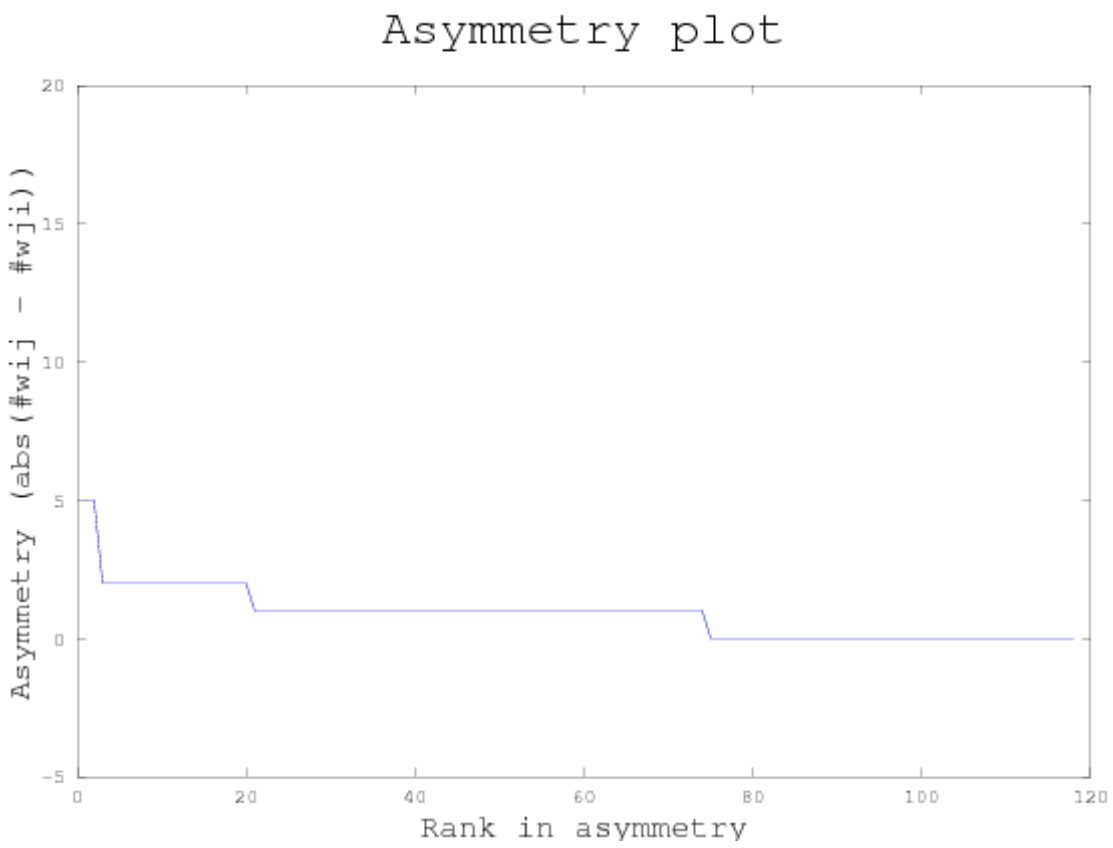
In [12]:
```
size(A)
```

```
ans =

   370     2
```

In [18]:
```
%-------------------------------------------------------------
%Compute asymmetry in migration events between site i and j
%Melian@KB May 2017
%-------------------------------------------------------------
A = dlmread('Asymmetry.txt');
B = unique(A,'rows');
[tf1, idx] = ismember(A,B,'rows');
y = accumarray(idx(:),1);
count = 0;
for i = 1:length(B);
    if B(i,1) ~= B(i,2);
    i;
       wij = find(B(:,1) == B(i,1) & B(:,2) == B(i,2));
       wji = find(B(:,1) == B(i,2) & B(:,2) == B(i,1));
       B(wij,:);
       B(wji,:);
```

```
        if ~isempty(B(wji,:));
        count = count + 1;
        ASY(count,1) = abs(y(wij,:) - y(wji,:));
        end
    end
end
Q = sort(ASY,'descend');
V = 1:length(Q);
plot(V,Q,"markersize",36)
xlabel ("Rank in asymmetry","fontsize",16);
ylabel ("Asymmetry (abs(#wij - #wji))","fontsize",16);
title ("Asymmetry plot","fontsize",24);
axis([0 120 -5 20])
```



In [ ]: Asymmetry plot accounting for connectance and Euclidean distance for A = 100 and f = 0.1 -- Most pairwise sites have asymmetry close to zero (approx 75%) -- *explore broader space of A and f,* is asymmetry low across all the parameter space?
Model a scenario with higher asymmetry -- which one?