
```

%a
N = 200;
tp = linspace(0, 2.*pi, N);
tpp = exp(cos(tp));

D1 = zeros(N,N);
for k=1:N
    for j=1:N
        if k==j
            D1(k,j) = 0;
        else
            D1(k,j) = (((-1).^(k+j))./2).*cot((k-j).*pi./N);
        end
    end
end
D2 = zeros(N,N);
for k=1:N
    for j=1:N
        if k==j
            D2(k,j) = -N.^2./12-1./6;
        else
            D2(k,j) = -(-1).^(k+j)./2.*sin((k-j).*pi./N).^(-2);
        end
    end
end

D1tp = D1*tpp';
D2tp = D2*tpp';

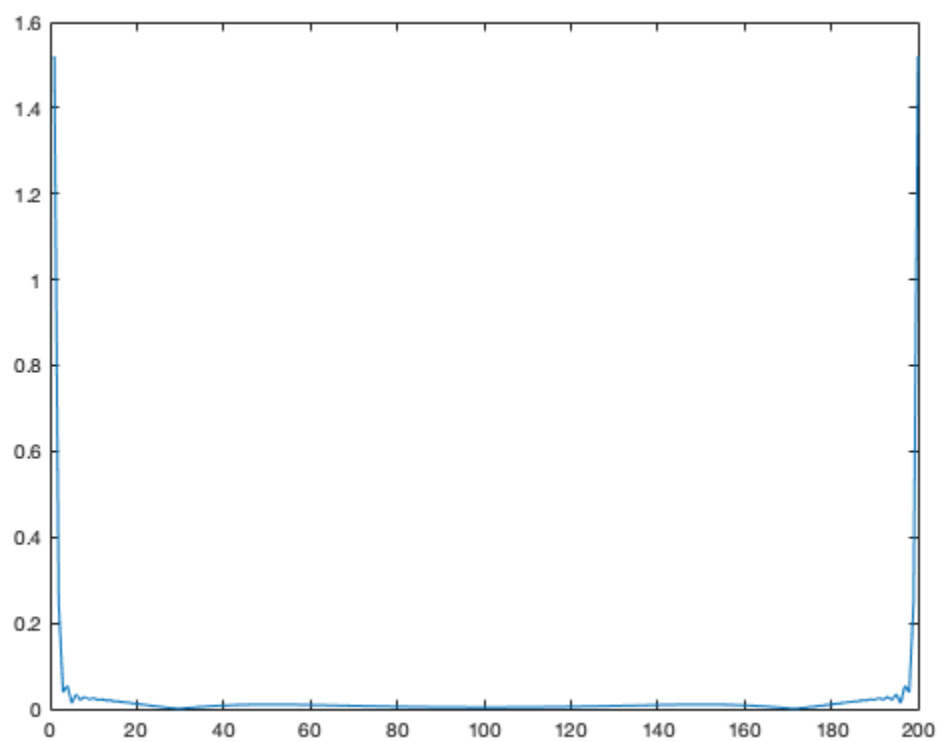
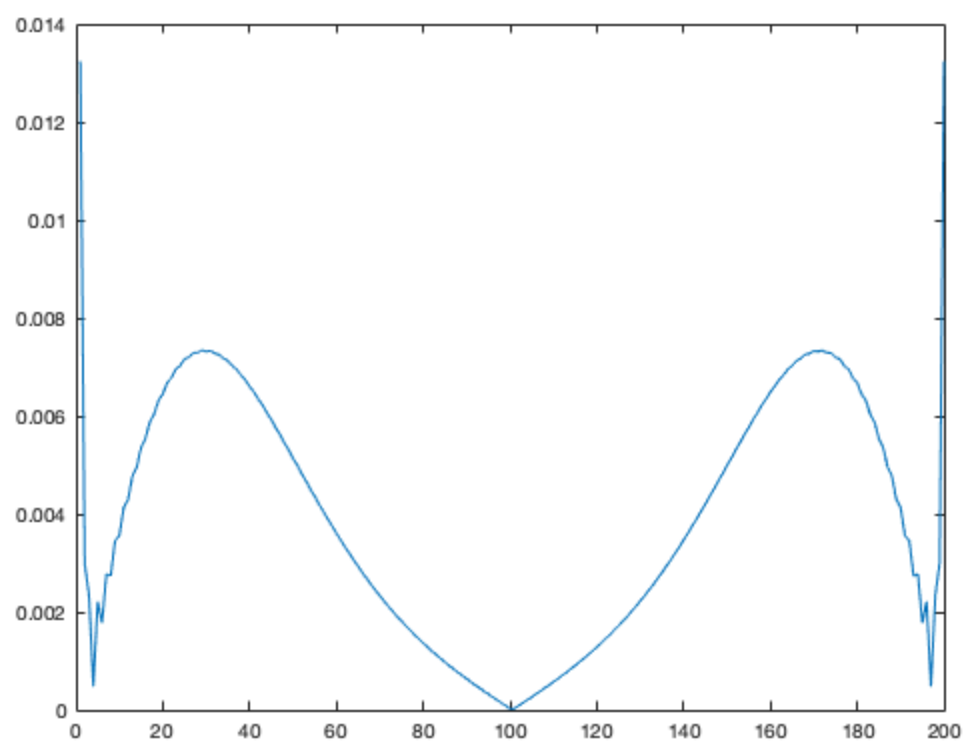
D1tpE = sin(tp).*(-exp(cos(tp)));
D2tpE = (sin(tp).^2-cos(tp)).*(exp(cos(tp)));

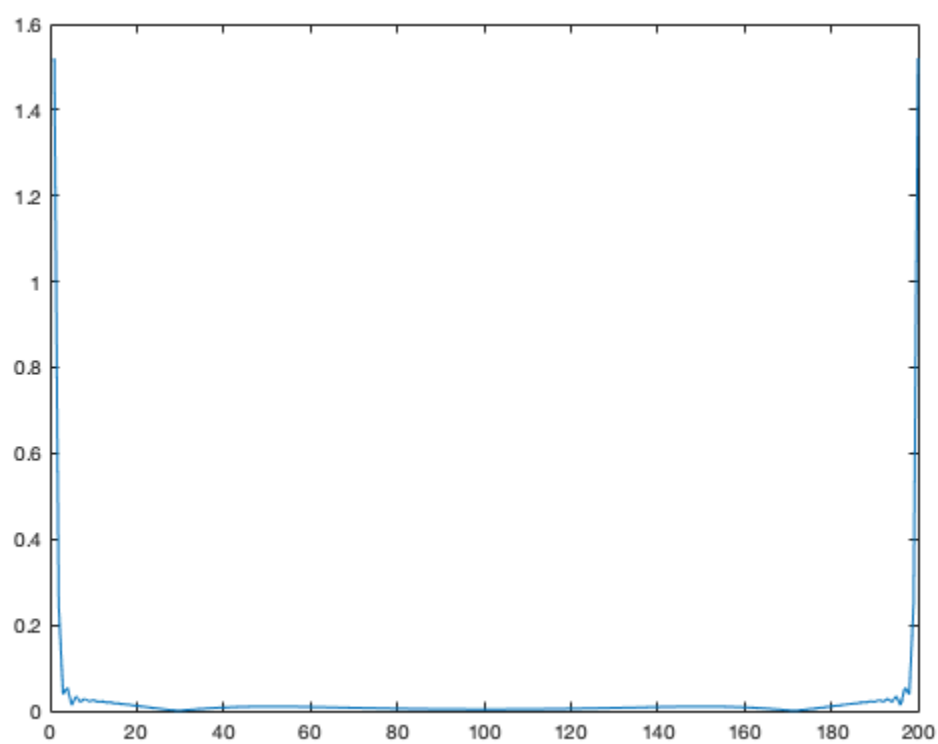
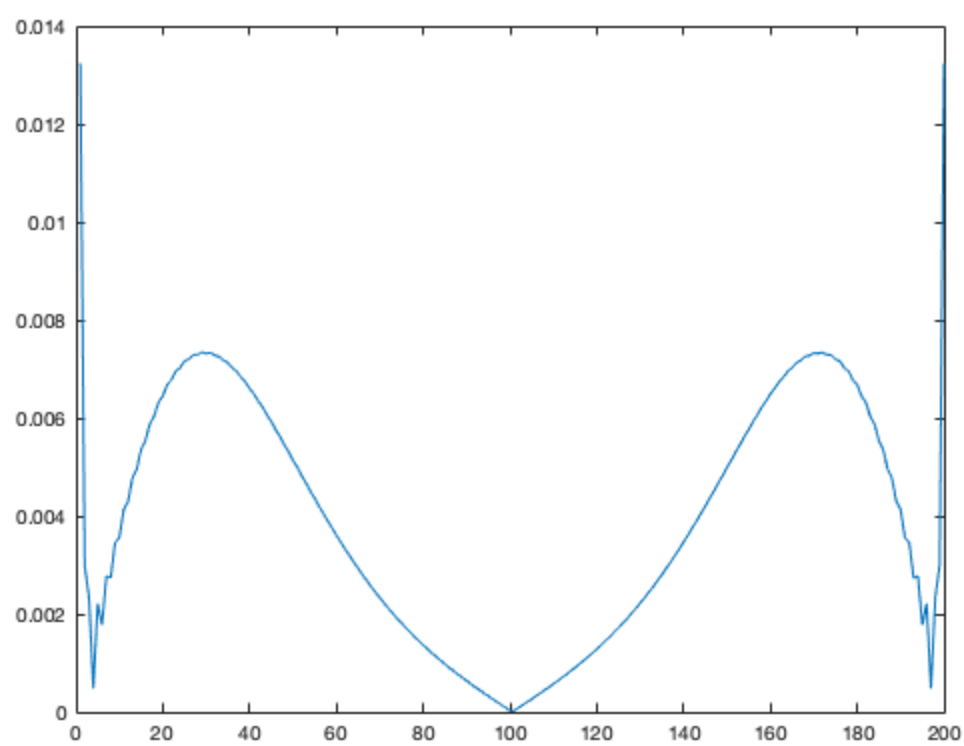
figure;
plot(abs(D1tp-D1tpE));
figure;
plot(abs(D2tp-D2tpE));

%b
k = [0:N/2-1, 0, -N/2+1:-1];
vt = fft(tpp);
vt1 = (i.*k).*vt;
vt2 = -(k.^2).*vt;
dt1 = ifft(vt1);
dt2 = ifft(vt2);

figure;
plot(abs(dt1-D1tpE));
figure;
plot(abs(dt2-D2tpE));

```





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