SAMPLE CALLS

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% (1) TO MAXIMIZE THE LARGEST EIGENVALUE
% (this is specifically the numerical radius example)
% (compute the numerical radius of GR320, the Grcar matrix of size 320)
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>> pars.tol = 10^-12
>> pars.maxit = 20
>> pars.bounds.lb = 0
>> pars.bounds.ub = 2*pi
>> pars.isprint = 0 % (set this 1 to print, default is 0 not print)
>> pars.gamma = -2*norm(GR320);
>> M{1} = sparse(GR320);
>> [f,z] = leigopt_max('numrad',1,1,M,pars)

%%%%
%% second parameter: # of parameters = 1
%% third parameter: largest eigenvalue to be maximized
%% fourth parameter: must be a cell array containing the matrices
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% (2) TO MINIMIZE THE SMALLEST SINGULAR VALUE
% (this is specifically the distance to instability example)
% (compute the distance to instability of tols1090S,
% the Tolosa matrix of size 10900)
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>> pars.tol = 10^-12
>> pars.bounds.lb = 150;
>> pars.bounds.ub = 160;
>> pars.z0 = 155;
>> C{1} = tols1090S;
>> C{2} = speye(1090);
>> C{3} = C{1}'*C{1};
>> C{4} = C{2}'*C{1};
>> C{5} = C{2}'*C{2};
>> pars.sq = [0 0 1 1 1]';
>> [f,z] = lsvdminopt_min_general('distinstab_general',1,1,C,pars)

%%%%%%%%%
%%%%%%%%%
%% not only the coefficient matrices A1, A2 in the defn of the matrix-valued
%% function are paseed, but also A1'*A1, A2'*A1, A2'*A2
%% these are passed inside the cell array C
%% To indicate, which cell entries  are originals, which ones are products
%% we set pars.sq = [0 0 1 1 1]'
%%%%%%%%%
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% (3) TO MINIMIZE THE LARGEST EIGENVALUE
% (This concerns example 5 in the paper "A Subspace Method for Large-Scale
% Eigenvalue Optimization")
% In particular the largest eigenvalue
% of AF500 = diag(Ctilde250, CtildeC250) is minimized below
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%%%%%%%%%%%
%%% Form the matrix-valued function first
%%%%%%%%%%%
>> n = 250
>> C250 = zeros(n);
>>for j = 1:n-1
C250(j+1,j) = j+0.1;
C250(j+2:n,j) = j*ones(n-j-1,1);
end
>> C250 = C250 + C250';
>> IU250 = zeros(n);
>> IL250 = zeros(n);
>> IU250(1:n/2,1:n/2) = eye(n/2);
>> IL250(n/2+1:n,n/2+1:n) = eye(n/2);
>> AF500{1} = (1/(100*n))*[C250 zeros(n); zeros(n) -C250];
>> AF500{2} = [IU250 zeros(n); zeros(n) -IU250];
>> AF500{3} = [IL250 zeros(n); zeros(n) -IL250];
%%%%%%%%%%%%%
% Now optimize
%%%%%%%%%%%%%
>> pars.bounds.lb = [-10; -10];
>> pars.bounds.ub = [10; 10];
>> pars.gamma = -10^-6;
>> [fd,zd,itnum] = leigopt_min('affinefunction',2,1,AF500,pars);


%%%%
%% second parameter: # of parameters = 2
%% third parameter: largest eigenvalue to be minimized
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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
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