Based on sinefeld marom analytical method for the propagation of a gaussian beam on a pixelated SLM

1. Analysis of diffraction efficiency and crosstalk by means of fiber output position (delta\_pos) and position that the beam is reflected by the SLM (delta)
2. Basic Principle: when delta = delta\_pos coupling efficiency to the chosen output valuem, while for different values of deltas crosstalk to other ports
3. Meaning of the used parameters: pixel = pixel pitch, fiber\_port = distance between ports, ports: -4 denotes -4th diffraction order (upper port) etc., omega = spot size on SLM
4. Exported parameters: Eout: power-coupling efficiency & cp: spectral tranmittance (dB)

clear all; clc

Eout = 0; Eout2 = 0; pixel = 6.4e-6;

omega=10e-6;lamda=1550e-9;

iter = 0; theta=3; fiber\_port=1.25e-3; fl = 0.035; delta = fiber\_port\*(1);

ports=-4:4;

for jj = 1:length(ports)

lamda\_factor(jj) = (lamda\*fl)/(delta\*pixel);

delta\_pos = fiber\_port\*ports(jj)

phi(jj) = delta\_pos/fl;

for pix\_count = -500:500

iter = iter + 1;

A\_term = 0.5\*exp(-0.5\*((pi\*omega\*delta\_pos)/(fl\*lamda))^2);

phase\_d = ((2\*pi)/lamda\_factor(jj))\*pix\_count;

C\_factor=erfz((lamda\*pixel\*(2\*pix\_count+1)-1\*j\*pi\*omega^2\*phi(jj))/(sqrt(2)\*lamda\*omega))-...

erfz((lamda\*pixel\*(2\*pix\_count-1)-1\*j\*pi\*omega^2\*phi(jj))/(sqrt(2)\*lamda\*omega));

Eout = Eout + A\_term\*exp(-1\*j\*phase\_d)\*C\_factor;

keep(iter,jj) = exp(-1\*j\*phase\_d);

end

cp(jj) = 10\*log(abs(Eout).^2);

Eout = 0; iter = 0; output\_efficiency = 0; C\_factor=0;

end

figure;

b = bar(cp,'FaceColor',[0 .5 .5],'EdgeColor',[0 .9 .9],'LineWidth',1.5);

b(1).BaseValue = -70;

xlabel ('Output Ports','Interpreter','latex');ylabel ('Tranmittance $(dB)$','Interpreter','latex');

set(gca,'Linewidth',2);set(gca,'TickLabelInterpreter','latex');set(gca,'TickLength',[0, 0]);set(gca,'LooseInset',max(get(gca,'TightInset'), 0.02))

ax=gca;ax.FontSize=14;pos=get(gca,'pos');set(gca,'pos',[pos(1) pos(2) pos(3) pos(4)\*.95]);

%print('crosstalk','-dsvg','-r600') % save high-quality figure

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