**AE4233 MDO Tutorial 2**

**Interactive demo MDF and IDF Schemes**

1. Write down your objective function
2. Write down all your design variables
3. Write down bounds/constraints
4. **MDF**: Think about how to implement the consistency between y1 and y2 (e.g. the system coordinator). See block diagrams previous slides.
5. **IDF:** Same as 4 but now with surrogate variables. See block diagrams previous slides.

Start the implementation in MATLAB:

1. Write a separate function file for your Objective function. This function returns the objective J(x) and takes the design vector x as input.

For example:

*function [J] = Objective(x)*

*..{MATLAB Expressions}..*

*J = …*

*end*

1. Write a separate function file for your constraints, this function takes as input the design vector ***x*** and returns the inequality constraint vector ***c*** and equality constraint vector ***ceq***:

For example:

*function [c ceq] = Constraints(x)*

*..{MATLAB Expressions}..*

*c = [ c1 c2 c3 c4 …]*

*ceq = [] ;*

*end*

*% Note: if no inequality constraints: c = [ ] ;*

*% Note: if no equality constraints ceq = [] ;*

1. Write your main .m file to start the optimization. Define the initial design vector ***x*** and the bounds.

For example:

clc;

clear all;

close all ;

x0 = [ ….] % initial design vector

LB = […] % lower bounds

UB = […] % upper bounds

**% Choose an active set algorithm and display iterations (optional)**

options = optimset(‘Algorithm’,’active-set’,’Display’,’Iter’) ;

**% Start optimization**

[x,fval,exitflag] = fmincon(@(x) Objective(x),x0,[],[],[],[],LB,UB,@(x) …Constraints(x),options)

**% Note that for this exercise, there are no linear equality and inequality constraints so those entries are left blank: [],[],[],[]**