Presentation

1. Signalling the Start – Introductions

OK then,	let's begin.
	can we start?
	shall we start?
	shall we begin?
Right then,	I think we should begin.
	let's start.

2. Greetings

Good morning / afternoon	ladies and gentlemen.
	everyone.

3. Introducing Oneself

I would like to begin **by** introducing myself.
First **of** all I would like to introduce myself.

My name is	....
I am	
As some **of** you may know, I am	

I come from ....

I work	as a .... *(job)* **for** .... *(compony)*.
	for .... *(company)* as a .... *(job)*.

4. Introducing the Topic

I am here today **to** ....
I am going to talk **to** you today about ....

My	aim	today is **to** ....
	objective	**of** this meeting is ....
	purpose	

5. Outlining the Main Points

There are *5* points **on** the outline.
I would like to go through the outline.
The first point **on** the outline is ....

Let's	move **on**	**to** the next point ....
	go **on**	
	return	
	go back	

Firstly Secondly Thirdly Then After that Next Finally	I	would like to will want to am going to	talk about ....

6. Sequencing

I would like to give you the background (the main facts)

- Can you give us the backround?

I would like to move **on** to my next point ....

As you know, ...
As some **of** you know, ...
As you probably know, ...
As you all know, ...

In the other worlds, ...
On the other hand, it is, ...

As I have said several times already, it is ....
For example, you should ....
After that ....
I would like **to** refer back ....
This brings me **to** my final point ....

7. Referring to Visuals

Have a look **at** this diagram.
Have a look **at** the graph.
I would like you to look **at** the graph. As you can see ....
Now, if we turn **to** the next figure ....
Finally, let's look **at** the last figure ....

8. Summarizing

Finally, I would like to go over the main points **of** my presentation.

Finally I would like to	summarize review go over	the main points. my main points.

					pointed out	
Firstly		talked **about**			suggested {naznačil}	
Secondly		discussed			drew your attention **to** {líčil}	
Thirdly	I	analysed	.... and	I	recommended {doporučil}	....
Fourthly		showed you			explained	
Finally		looked **at**			showed you	
					illustrated	
					focussed **on**	

	first		focussed **on**			suggested
The	second	I	looked **at**	was	and I	pointed **out**
	third		talked **about**			showed you

9. Concluding

In conclusion ....

I would like to	finish conclude	**by** saying that ....

Are there any questions ....

If you have any questions	I will be happy I would be happy I will do my best	to answer them.

Thank you **for**	listening. attention.

10. Dealing with Questions

There are different ways of answering questions:

- gaining time **to** think
- not understanding a question
- make a point
- disagreeing
- referring back **to** a point you made
- clarifying a point you made
- etc ....

11. Handing Questions in the Middle of Presentation

Can I return **to** / come back **to** / answer that later.

I will be happy **to** answer questions / There will be time **for** questions **at** the end **of** the presentation.

12. Condition Sentences

If it **rains** I **will** go home.

If you **liked** me I **would like** you too but you do not like me.

If I **had decided to go** to CTU I **would** not **have been** successful. :-)

13. Example of presentation

Slide 1:

Ok then, shall we start? Good afternoon everyone. I would like to begin by introducing myself. My name is .... I deal with a model predictive control of two-dimensional systems. My supervisor is ....

Slide 2:

I am going to talk about distributed parameters systems and the model predictive control approach. There are 5 points on the outline. Firstly I would like to talk what the distributed parameters process and the model predictive control strategy are. Secondly I will introduce two industrial systems which have the distributed parameters behaviour. Thirdly I want to talk about a description of distributed parameters processes. Then I will talk about the model predictive control strategy and finally I would like to talk about my future research.

Slide 3:

There are many industrial processes that have distributed parameters behaviour. Consequently, these processes cannot be modelled by lumped inputs and lumped outputs models for correct representation. This is the main motivation for my research that deals with two-dimensional dynamic processes (systems with parameters dependent on two spatial directions) and the model predictive control of these processes.

Slide 4:

So the distributed parameters systems can be described by partial differential equations. These equations contain the derivative with respect to spatial directions. There are many industrial processes that have the distributed parameters behaviour and can be described as lumped inputs and distributed output models. For example, glass furnace, where the temperature profile (distributed output) is controlled by a number of burners (lumped inputs), or paper machine, where the paper stock over the wire (distributed output) is controlled by a number of tubes (lumped inputs). Note that the accurate control is very important for the quality of the output product. For example, the accurate temperature profile assures a glass mixing, it is influence on the melt homogenity and the glass quality.

Slide 5:

Now I would like to move on the next point of my presentation, the mathematical model of two-dimensional systems. As I said, the distributed parameters systems can be described by the partial differential equations. This is the special type of PDE, parabolic linear stationary PDE where Θ is a temperature distribution, λ is a surface thermal conductivity, f represents a surface heat source and this is the Nabla operator. If the thermal conductivity coefficient is independent on the temperature, the equation one can be written as this.

Slide 6:

Then an unknown temperature profile must satisfy this partial differential equation on an open set Ω and some of these boundary conditions. Unlike the Dirichlet boundary condition defines the temperature on the bound of the set Ω explicitly, the Neumann and Newton boundary conditions define the temperature on the bound of the set Ω implicitly through these statements.

Slide 7-8:

On this slide, the basic idea of the finite difference method is shown. The set Ω is covered by the imaginary mesh and the second derivatives are approximated by the second differences.

This is the set definition of all interior points and this is the set of all points of the set Ω. After the finite difference approximation, the partial differential equation one is transformed to the equation system with large dimension with these coefficients.

Slide 9:

For the solving of that equation system, the matrices Θ and F are converted to the vectors and then the equation system can be written in the compact form where matrices P and F_v depend on the type of boundary conditions.

The equation six can be solved by direct or indirect methods. The direct method is based on the inversion of the matrix P. The indirect method is based on the cyclic updating the values in vector Θ_v.

Slide 10:

Now I would like to move on the next point of my presentation. This is the evolution partial differential equation where the coefficients are a surface density and thermal capacity of a medium. Then the unknown temperature profile must satisfy the equation seven and one of the boundary condition for all time horizon and an initial condition. If the thermal conductivity coefficient is independent on the temperature, the equation seven can be written as this.

Slide 11:

Using the statement $P\Theta_v=F_v$ and explicit scheme, the evolution partial differential equation can be solved by the statement eight. Using the implicit scheme, the evolution partial differential equation can be solved by the statement nine. Note that unlike the explicit scheme, the implicit scheme is unconditionally stable.

Slide 12-13:

There is an example of the partial differential equation solution with the Dirichlet boundary condition. I would like you to look at this figure. You can see the heat source distribution and the steady state temperature profile. On the next slide, there are step responses of temperature in the several points.

Slide 14-15:

This slide presents an example of the partial differential equation solution with the Newton boundary condition. You can see the heat source distribution and the steady state temperature profile. On the next slide, there are step responses of the temperature in the several points.

Slide 16:

Now I would like to move on the next point of my presentation, the model predictive control approach. We consider the linear state model, a prediction horizon T_p and input/output constraints. For the data filtering, the Kalman filter or smoothing methodology can by used.

Slide 17:

This equation expresses the output prediction, where the tilde **y** represents the response to the initial condition x and the term **Su** represents the response to the inputs on the prediction horizon.

Slide 18:

As I have said several times already, the practical systems have input and output signal limited. So we must consider these constraints at the optimal control design. For the reference **w** the optimality criterion can be expressed as that subject to these conditions. This is the standard QP problem. The optimality criterion can by defined for the rate of change of the manipulated variable.

Slide 19:

This slide presents the range control strategy. The basic idea of the range control is replacement of the set point reference by low and high limits. This strategy is very stable and robust because the manipulated variables do not compensate the high frequency component of the noise. The optimality criterion is defined by this statement subject to these conditions. Note that unlike the classical MPC approach is the minimization over the variable *u*, the range control strategy is the minimization over the variables *u* and *w*.

Slide 20:

Finally, I would like to go over the main points of my presentation. I have showed that the distributed parameters processes can be modelled by partial differential equations. These equations can be solved by the finite difference methods. Unfortunately the problem dimension is too huge for the control design. So firstly I will focus on the model reduction, for example, using the proper orthogonal decomposition that is based on replacement of the difference operator by a number of eigenfunctions. The main query is how to find the dominant eigenfunctions. And next I will have to focus on the constraints of the controlled variables in spatial directions.

I would like to finish my presentation. Thank you for your attention.