1

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 28J10101 |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏名 | Xu Guangyin |

| 科目 | 担当教員 |
|---|---|
| | |

Nov 29th

Summary of today's lecture.

At first, Prof. Hasegawa described why we can combine a block like $x \to \boxed{G_1} \to \boxed{G_2} \to \cdots \to \boxed{G_n} \xrightarrow{y}$ into a block like $\xrightarrow{x} \boxed{G_1 G_2 \cdots G_n} \xrightarrow{y}$ by using L.E. Then we studied how to simplify a complicated block into a comparative simpler block. We know that maybe there is no sense for a Feedforward system. Prof. Hasegawa gave us some very vivid examples to understand it. I was very concerned with one example that ship rolling equation in the calm water case, and I knew how to use L.E to conduct the rolling equation. The concept of system stability also was introduced by practicing a control of a column in a expected position. At last we studied a parameter determine method of N(s)/D(s). I think maybe we must assume the order of numerator should be one order lower than the order of denominator if we wanted to get the right answer.

pole?

V.G.

工学部・工学研究科

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 28J10105 |
|---|---|---|---|---|---|
| | | | | フリガナ | MAO BANG CHENG |
| | | | | 氏名 | 毛邦成 |
| 科目 | | | | 担当教員 | |
| | | | | | |

Today's Lecture, first we talked about the important news happened on last week. China said that America and South Korea's Army can't do anything on China's EEZ. And I studid that EEZ is Exclusive Economical Zone. Though I hate war, but I felt proud that China is not as weak as before. China is always strong in their mind!

Then we learnt how to get the control system's function using the block diagram. It's important, because we solve the Engineering's problem using math method. As you know, our Major is Marine Architecture and Ocean Engineering, we learn the lecture just for dealing with rolling of ships, the most importance is the system's stability. We learnt how to check the system stability. That's the ture main I think.

So maybe next we'll learn how to deal with more difficult things. But I have confidence.

V.G.

11/29

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 28J10004 |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏名 | Yuto Ito |

| 科目 | 担当教員 |
|---|---|
| | |

Today's important keywords are "Feed forward" and "System stability".

"Feed forward" is a system to control a process using its anticipated results or effects.

When we go down stairs, we predict the next step and move legs.

When we drive on a winding road, we look at the road's curve in advance.

In the "system stability", G(s) is defined as "$\frac{N(s)}{D(s)}$" in general.

The denominator "D(s)" plays an important roll for system stability.

Prof. Hasegawa showed us the example.

Good.

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 28J10025 |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏　名 | Risa Kitamoto |
| 科　目 | | | 担当教員 | | |
| | | | Prof. Hasegawa | | |

Today's contents of the lecture is "System Stability".
We should consider the stability of the system to treat the system.
Firstly the details of the system like $G(s) = \frac{N(s)}{D(s)}$ is written using the motion equation or block diagrams. If $\frac{N(s)}{D(s)}$ can be obtained, we can know the system is stable or not.

30

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 28716103 |
|---|---|---|---|---|---|
| | | | | フリガナ | ケ ロ ヒン |
| | | | | 氏　名 | 虞 魯 斌 |

| 科　目 | 担　当　教　員 |
|---|---|
| Control system theory | 長谷川 教授 |

I believe this lecture is the one of most important lectures so far. Because In this lecture we learned how to simplify the block diagram and combine the feedback system and Feedforward system. Moreover, We also summrized what we have learned by far, and used them like Laplace transform theory and equation of control system and so on to apply in some simple cases to judge the stability. However, in the real cases, we usualy meet with a complex system which constitues many items in the diagram and also in Numerator or Denomenator of G(s) or H(s). So, it's necessary to solve and simplify them. when solving such problems, I found some methods like how to get the coefficent of Nemerator like equation $\frac{A}{(s+2)} + \frac{B}{(s+3)} = \frac{s+4}{(s+2)(s+3)}$. We can assume $s=-2$, and multiply $(s+2)$ to each term, then, we will obtain $(A + \frac{B}{(s+3)} = \frac{s+4}{s+3})$ where $s=-2$, $A+B = s+4$. As a result, s will be known easily.

I really became interested in this lecture more and more, and I am sure I will make more effort on this lecture. and I also appreciate for professor's clear and vivid description and explanation.

Thank you!

V.G.

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 28J10083 |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏　　名 | Shuji Matsuoka |

| 科　　目 | 担　当　教　員 |
|---|---|
| | |

· Block diagram is simplified by using Laplace Transformation. This transformation enables us to make easy to understand and use system.

· Feedforward system controls and modifies input date befor the result which is estimated and predicted. In generally feedfoward system is combined with Feedback system.

· Stability is defined that initial condition is kept after that disturbance is given in system.

not good enough, but I understand what you want to say.

good.

11/29.



| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 28J10003 |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏　名 | 磯部雄一郎 (Yuichiro Isobe) |
| 科　目 | | | 担当教員 | | |

Today's Summary

Firstly, I learned about Feed forward system today. Last classes, we learned the feed back system but the feed back system is not enough to control the everything.
In case of stepping the stair, we cannot use the feed back system. So, If we use the feed back system, we fail to get next step.
Because, in case of feed back system, it can control our legs after the some reaction.
However, we must control our legs to step the stair before the some reaction.
This control system is "Feed forward system."
So, In control we must use not only feed back system but feed forward system.

Secondly, I learned the system stability.
System stability means that the system is stable or un-stable by using Laplace transformation.
In genaral, control system is $G(s) = \frac{N(s)}{D(s)}$.
D(s) plays important role for systems stability.
If D(s) can be shown $e^{-\lambda t}_{(1<\lambda<1)}$ this system is stable.

Very good.

29/11/2010



| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 2 8 J 1 0 1 0 9 |
|---|---|---|---|---|---|
| | | | | フリガナ | TOKGOZ EMEL |
| | | | | 氏　名 | トクギョス エメル |

| 科目 | 担当教員 |
|---|---|
| | |

At the beginning of the lecture latest news are talked. Apart from the lecture, these free talking helped me to realize that I "do not" watch / read the news lately. Related to lecture, some examples are held to simplify the block diagrams. Another option (feed forward control) to control the system is mentioned. It is mentioned that a complete feed forward control system does not exist. The "stairs example" helped me to recognize feed back and feed forward control systems. The differential equation of the system can be obtained from the block diagram of the system. Moreover, by using the differential equation of the system the block diagram can be illustrated. Equation of rolling motion of ships is expressed. G(s) is defined with "nominator" and "denominator". Finally, by using Laplace transformation the behaviour of the system is obtained. It is mentioned that dominator has an important role to define if the system is "stable" or not.

Very Good.
easy to read.

2010/11/29.

S·I = 28J10108



| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏　名 | Yaseen Adnan Ahmed. |
| 科目 | | | 担当教員 | | |
| | | | | | |

Today, we have learnt about the polar representation of $G(s)$ i.e. $G(s) = r \cdot e^{i\theta}$. and for $y_n = Gx$, where $G = G_n G_{n-1} \cdots G_1$ then $G = r \cdot e^{i\theta}$, where, $r = \prod_{i=1}^{n} r_i$ and $\theta = \sum_{i=1}^{n} \theta_i$. Then, we have learnt how to simplify any block diagram costists of number of systems into a simple diagram costists of single system providing same input & output. We then learn about the feed forward system. and we have come to know that this feed forward controller cannot exist alone, it must have feed backward controller too. Then, to know the behaviour of the controller, we are introduced with "System stability". A system is said to be stable, if distorted from the equilibrium, it can regain it's place again. Thus, if $G(s) = \frac{N(s)}{D(s)}$ in general, then $D(s)$ will play a vital role to determine the stability of the system than $N(s)$. where, $N(s)$ & $D(s)$ are both the polynomial of $s$.

So, the introduction of polar representation of $G(s)$, the feed forward system and the stability of system are the important topics of today's lecture.

✓ J.G.

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 28J10096 |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏　名 | Yuki Yamamoto |

| 科　目 | 担当教員 |
|---|---|
| | |

∘ If many systems exist in a block diagram, we can combine it.

For example,

$$\xrightarrow{x} \boxed{G_1} \rightarrow \boxed{G_2} \rightarrow \cdots \boxed{G_n} \xrightarrow{y} \quad \Rightarrow \quad \xrightarrow{x} \underbrace{\boxed{G_1 G_2 G_3 \cdots G_n}}_{G} \xrightarrow{y}$$

If $G_i = r_i e^{i\theta_i}$ and $G = re^{i\theta}$,

the amplitude $r$ is expressed by the product of $r_i$,

and the phase $\theta$ is expressed by the sum of $\theta_i$.

∘ If we understand a block diagram, we can know whether the system is stable or not by checking the doneminator of the block diagram.

For example,

$$\xrightarrow{x} \boxed{\frac{s+4}{s^2+5s+6}} \xrightarrow{y}$$

$$\Downarrow$$

$$\rightarrow \boxed{\frac{a}{s+2} + \frac{b}{s+3}} \rightarrow$$

Applying Laplace Transform,

$$\mathcal{L}^{-1}\left\{\frac{a}{s+2} + \frac{b}{s+3}\right\} = ae^{-2t} + be^{-3t}$$

If this values are negative,

the system should be stable.

Because $\lim_{t\to\infty} e^{-2t} = 0$.

Try to summerize the contents, but not the way.

2010/11/29

(28J10110) Blandon Juan

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | □□□□□□□□□□ |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏　名 | ブランドン フアン |

| 科　目 | 担当教員 |
|---|---|
| | |

Very nice!!
You now catch "ン" and "ソ"!

In todays lecture, it was explained how to obtain the differential equation of a system, having the block diagram of the system. This process can also be done in the inverse way; having the differential equation we can obtain the block diagram of the system.

Today we also studied how to determine the differential equation of the rolling of ships, based in second law of Newton, it was explained that this kind of system is similar to the mass-spring system.

We also spoke about the system stability, which is the hability of the system to recover from an external disturbance, it was explained how to determine the stability of the system and as a keypoint it was said that the denominator of the G(S) plays an important role in order to determine the roots of our system; According to this roots, if we observe the exponential behavior of the response graph going close to zero, the system is said to be stable, if not it is unstable.

V. G.

| 入学年度 | 学科／専攻 | 学科目／課程 | 年次 | 学籍番号 | 2871d009 |
|---|---|---|---|---|---|
| | | | | フリガナ | |
| | | | | 氏名 | 岩崎雅哉 |

| 科目 | 担当教員 |
|---|---|
| | Masaya Iwasaki |

(29. Nov) ~~lecture~~

In the lecture, I learned system stability.
For example, rolling of ships.
If one small disturbance comes and the ship recover itself,
the ship is stable.
Next, I approached mathematically.

$$\xrightarrow{x} \boxed{G(s)} \xrightarrow{y}$$

$$G(s) = \frac{N(s)}{D(s)}$$

N: Nominator

D: Denominator

D(s) plays important roll for system stability
If you try to get "y"

$$y(t) = \mathcal{L}^{-1}\{G\}x(t) = \mathcal{L}^{-1}\left\{\frac{N(s)}{D(s)}\right\}x(t)$$

for example, $\frac{s+4}{s^2+5s+6}$ ← N(s) ← D(s)

$$= \frac{N_1(s)}{s+2} + \frac{N_2(s)}{s+3} = \frac{2}{s+2} - \frac{1}{s+3}$$

$$y(t) = 2\mathcal{L}^{-1}\left\{\frac{N_1(s)}{s+2}\right\} - \mathcal{L}^{-1}\left\{\frac{N_2(s)}{s+3}\right\}$$

$$y(t) = 2e^{-2t} - e^{-3t} + y(0)$$

Try not to use equation.

$t \to \infty$