Lecture1

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Welcome!

- Computational Microelectronics (계산전자공학)
  - Code: EC7114
  - Lecture 3, no expermiment, credit 3

- Instructor, Sung-Min Hong
  - School of EECS

Resources

- Course board
  https://sites.google.com/view/gist-sdsl

- Presentation materials & Homework submission
  https://github.com/hi2ska2/cm2018f

- YouTube channel
  https://www.youtube.com/channel/UCSmzU9aDVgIa4bo_R47mI2Q
  – Or, type "Sung-Min Hong" in the YouTube search tab.

Evaluation

- Attendance (20%)
- Homework (40%)
- Final presentation (40%)
  – Your own presentation
- For students from the physics department
  – No advantage/disadvantage rule

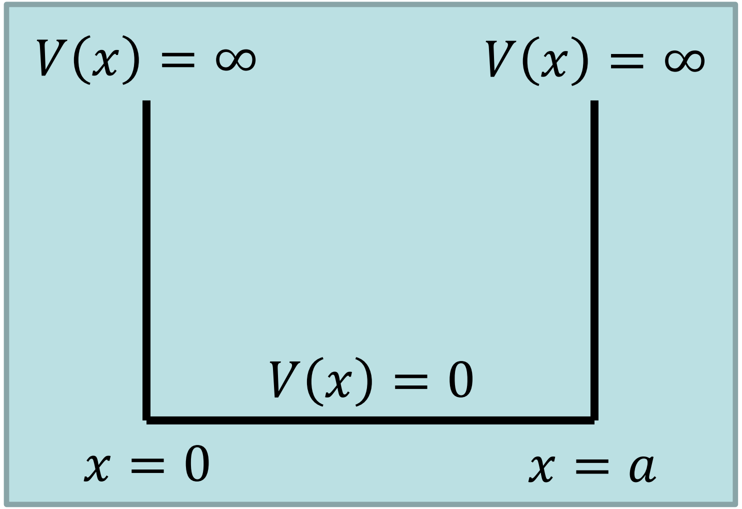
Infinite potential well (1)

- A particle in an infinite potential well
  - Schrödinger equation

$$-\frac{\hbar^2}{2m}\frac{d^2\psi(x)}{dx^2} = E\psi(x), \qquad 0 < x < a$$

  - Boundary conditions:

$$\psi(0) = \psi(a) = 0$$



  - It's an eigenvalue problem.

$$\frac{d^2\psi(x)}{dx^2} = -\frac{2mE}{\hbar^2}\psi(x) = -k^2\psi(x)$$

Infinite potential well (2)

- Sine and cosine functions can be solutions.

$$\psi(x) = A_1 \cos kx + A_2 \sin kx$$

  - Cosine term cannot satisfy the boundary condition at $x = 0$.

$$\psi(a) = A_2 \sin ka = 0$$

  - Then, we have

$$ka = \pi n$$

An integer

  - Therefore, allowed values of k are quantized.

Infinite potential well (3)

- Energy levels
  - The eigen-energy is written as $E_n = \frac{\hbar^2}{2m}\left(\frac{\pi n}{a}\right)^2$
- Wavefunctions
  - The eigen-function is written as $\psi_n = A_2 \sin\left(\frac{\pi n}{a} x\right)$

Homework#1

- Due: AM08:00, September 5
- Problem#1
  - Log-in into the GitHub site.
  - “Watch” and “Star” our hi2ska2/cm2018f repository.
  - Make a pull request with a file including your student ID.
- Problem#2
  - Watch my motion picture entitled “Infinite potential well,” which is uploaded in the YouTube channel.
  - Leave a comment in that motion picture. (Please identify yourself .)