UNIVERSITY OF OSLO

COMPUTATIONAL PHYSICS

Project 2

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2 METHOD

2.1 Nature of the problem

2.2 Gauss-Legendre Method for Computing the Integral

To be able to use the Gauss-Legendre method to compute the integral in [1], the limits of the integral must be made finite. Since the wave function

$$e^{-2\alpha x} \tag{2.1}$$

rapidly goes toward zero as x is increased (see fig), the integral can be approximated by the same integral with finite limits.

In this project, we [2] have accepted that 10^{-9} is close enough to zero to neglect contributions from the part of the wave function when the wave function gives a value of this order. For $x = 5$ the value of the wave function is $e^{-10\alpha} \approx 2.1 \cdot 10^{-9}$, when $\alpha = 2$. Hence, the considered integral that is to be solved by the Gauss-Legendre method is given by

$$\left\langle \frac{1}{|\mathbf{r}_1 - \mathbf{r}_2|} \right\rangle = \int_{-5}^{5} \frac{e^{-2\alpha x}}{|\mathbf{r}_1 - \mathbf{r}_2|} d\mathbf{r}_1 d\mathbf{r}_2 \tag{2.2}$$

[1] FiXme Note: ref. to problem eq
[2] FiXme Note: sorry about the ”we”

CHAPTER

3 CONCLUSION

Conclude.... conclude.... conclude....

Appendix

A MatLab code for smt....

This is how, we write MatLab code in the report

```
close all
clear all
clc
%I am a comment

filename = 'Results.xlsx';
sheet = 4;
xlRange = 'B3:C12';

[v,T,vT] = xlsread(filename, sheet, xlRange);
x10=v(:,1);y10=v(:,2);

figure
plot(??)
legend(??)

xlim([??])
ylim([??])

title(??)
xlabel('x')
ylabel('y')
```