Code package for: "Spatio-Temporal Coupling Controlled Laser for Electron Acceleration (DOI : 10.1038/s42005-022-00954-8)"

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1 MIT License

2 Run the code

This code package should work on Linux, Unix and Windows system automatically. The standard CPU is sufficient. The code is tested on a single CPU on a standard PC (Intel(R) Core (TM) i5-10400 CPU @ 2.9 GHz) and the running time is < 60 s. To execute the code, open the main.m file and click run.

2.1 Choose the input electric field

The code has the possibilities to change the input electric field as standard pulse-front-tilt (PFT), direct incidence and the spatial-temporal-coupled (STC) scheme. This function can be realized by switching the command in the main.m file via the following:

```
case_name= 'tpf_standard_chirp';
```

means the input field chosen to be the standard PFT scheme,

```
case_name= 'direct';
```

means the direct incidence laser without any optical manipulation, and

```
case_name= 'tpf_stc_chirp';
```

means the input field is chosen to be the stc scheme.

2.2 Choose the calculation case

In the main.m file, the acceleration by the electric field is defined by:

```
NM=NM.init(my_cons,electron,E,case_name);
```

The perfectly matched pulse (the envelope calculation) is represented by

```
NM=NM.init(my_cons,electron,E,'Euler_matched');
```

2.3 Change parameters of the laser and electron

The optical pulse parameters can be changed in:"my_functions/optical_parameter_construct.m"
The electron parameters can be changed in:"my_functions/electron_properties_construct.m"

2.4 data process

The choice of saving the plotted figure/data can be set in the main.m line 11 as the following

```
save_flag=1;
```

, where '1' represents save the figures and '0' represents don't save anything. All the saved files can be found under my_output folder.

Enjoy life and happy coding. For any question please address to

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