The code GLADIS computes the time-dependent evolution of a black hole
 accretion disk, in 1 dimensional, axisymmetric, vertically integrated scheme.
The code solves two partial-differential equations of hydrodynamics for surface
density and temperature evolution, i.e. given by
viscous diffussion and enery conservation.

Accretion disk can be subject to radiation-pressure instability, if the
stress tensor is porportional to the total (gas plus radiation) pressure.
In the gas-pressure dominated case there is no instability.
An intermediate case is provided in the code by the square root of the
gas and total pressures.

Configuration of the code, defined and explained with the comments
as in the routine konfig.c, can be done
for the code setup, physics parameters, and output.
The parameters are stored in the file dysk_zwm.ini.
This file has to be saved in the working directory, i.e. like Code_GLADIS/exe/.
The source code routines are stored in Code_GLADIS/src/.

Code is parallelized with MPI.
The running script "run" has to be made executable and put in the working
directory, together with code executable and configuration file.
Sample .ini and run command files are provided with the code.

The output files are:

A. lum.dat - history file with 3 or 4 colums:
1.time [sec],
2.log (Disk Luminosity) [erg/sec]
3.log (Disk surface integrated viscous flux) [erg/sec]
4.log (Corona Luminosity) [erg/sec]

B. sigma.000 and sigte.000 (number of files of each type
is equal to the number of grid points in radius).
They contain the local profiles of surface density, temperature, and disk
thickness. Files "sigma.000" etc. contain stationary S-curves, i.e. the local
solutions of the disk structure given by the initial condition at t=0.
Files "sigte.000" etc. contain time-dependent solutions.

B1. Columns in "sigma.000" files
1. Surface density [g/cm2]
2. Effective temperature [K]
3. Central temperature [K]
4. Local accretion rate [Eddington units]

B2. Columns in files "sigte.000" files
1. Surface density [g/cm2]
2. Effective temperature [K]
3. Total pressure [dyn/cm2]
4. beta (gas to total pressure)
5. Alpha viscosity
6. Disk thickness

If the mass exchange between disk and corona is turned on, the files contain 4
columns and in the last 2 columns there is surface density in the corona, and
mass exhange rate.

C. rsig.000 files - radial profiles for a chosen time. The time
is given by the number in the extension of the file rsig.* name. The columns
store:
1. radius [Rschw]
2. Surface density in disk [g/cm2]
3. Surface density in corona [g/cm2]

4. Mass exchange rate [g/s]
5. Disk thickness [cm]
6. Total pressure [dyn/cm2]
7. Gas pressure [dyn/cm2]
8. Kinematic viscosity
9. Radial velocity in the disk [cm/s]
10. Radial velocity in corona [cm/s]
11. Alpha visocity
Columns 3,4, and 10 are printed only if the mass exchange with the corona is on.

D. HDF files with density mapped into x-y plane, defined by disk radial and vertical extenstions.
The files are organized by the DZWM_model.xmf list.
They are prepared to make the color maps of density and temperature profiles with the graphic tools e.g. Visit. Grid is in logarythmic scale, in [cm]. Stored variables are:
1. log(Density) [g/cm3]
2. log (Temperature) [K]

Other types of graphs can be made with any tool.
Sample macro for Supermongo is provided with the code.
The users are encouraged to make their own macros
and use the graphics tools of their choice.
Also, extending the range of variables that are stored in the outputs
is possible while it needs to edit the source code (i.e. inout.c).

The research papers with results based on computations with this code:
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1. Janiuk Agnieszka, Czerny Bozena, Siemiginowska Aneta, "Radiation Pressure Instability Driven Variability in the Accreting Black Holes". 2002. ApJ, 576, 908

2. Janiuk Agnieszka, Czerny Bozena, "Time-delays between the soft and hard X-ray bands in GRS 1915+105". 2005. MNRAS, 356, 205

3. Janiuk Agnieszka, Czerny Bozena, "Accreting corona model of the X-ray variability in soft state X-ray binaries and active galactic nuclei". 2007. Astronomy & Astrophysics, 466, 793

4. Janiuk Agnieszka, Czerny Bozena, "On different types of instabilities in black hole accretion discs: implications for X-ray binaries and active galactic nuclei". 2011. MNRAS, 414, 2186

5. Janiuk Agnieszka, Misra Ranjeev. "Stabilization of radiation pressure dominated accretion disks through viscous fluctuations". 2012. Astronomy & Astrophysics, 540, 114

Any user who will make use of this software for his/her research, is kindly asked to give proper credit and citations to the above papers.

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