Transient & Restart

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4/21/2024

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Griffin: Steady State vs. Transient

Steady State

Transient

```
# ============================================
# TRANSPORT SYSTEM
# ============================================
[TransportSystems]
  particle                       = neutron
  equation_type                  = eigenvalue
  G                              = 16
  ReflectingBoundary             = 'left'
  VacuumBoundary                 = 'bottom right top loop_b
  [transport]
    scheme                       = CFEM-Diffusion
    family                       = LAGRANGE
    order                        = FIRST
    n_delay_groups               = 6
    assemble_scattering_jacobian = true
    assemble_fission_jacobian    = true
    external_dnp_variable        = 'dnp'
    fission_source_aux           = true
  []
[]
```

```
# ============================================
# TRANSPORT SYSTEM
# ============================================
[TransportSystems]
  particle                       = neutron
  equation_type                  = transient
  G                              = 16
  ReflectingBoundary             = 'left'
  VacuumBoundary                 = 'bottom right top loop_
  [transport]
    scheme                       = CFEM-Diffusion
    family                       = LAGRANGE
    order                        = FIRST
    n_delay_groups               = 6
    assemble_scattering_jacobian = true
    assemble_fission_jacobian    = true
    external_dnp_variable        = 'dnp'
    fission_source_aux           = true
  []
[]
```

- Remove initial conditions of the restarted variables.

Griffin: Steady State vs. Transient

Steady State

```
[Executioner]
  type                  = Eigenvalue
  solve_type            = PJFNKMO
  petsc_options_iname = '-pc_type -pc_hypre_type -ksp_gmres_restart'
  petsc_options_value = 'hypre boomeramg 50'
  l_max_its             = 200
  nl_abs_tol            = 1e-6
  fixed_point_min_its = 2
  fixed_point_max_its = 50
  fixed_point_rel_tol = 1e-6
  fixed_point_abs_tol = 1e-6
[]
```

Transient

```
[Executioner]
  type                  = Transient
  solve_type            = PJFNK
  petsc_options_iname = '-pc_type -pc_hypre_type -ksp_gmres_restart'
  petsc_options_value = 'hypre boomeramg 50'

  start_time = 0.0
  [TimeStepper]
    type                  = IterationAdaptiveDT
    dt                    = 1.0
    timestep_limiting_postprocessor = dt_max_pp
    optimal_iterations = 20
    iteration_window   = 2
    growth_factor      = 2
    cutback_factor     = 0.5
  []
  end_time              = 2000.0
  auto_advance          = true

  l_max_its             = 200
  nl_abs_tol            = 1e-5
  fixed_point_min_its = 1
  fixed_point_max_its = 50
  fixed_point_rel_tol = 1e-5
  fixed_point_abs_tol = 1e-5
[]
```

Restart Griffin Steady State Solution

- Remove initial conditions of the restarted variables.

- Restart steady state transport solution from binary file using user object.

```
# =========================================================
# USER OBJECTS FOR RESTART
# =========================================================
[UserObjects]
  [transport_solution]
    type             = TransportSolutionVectorFile
    transport_system = transport
    writing          = false
    execute_on       = 'INITIAL'
    scale_with_keff  = false
    folder           = '../../ex2_ss/ex23_fp_multiphysics/'
  []
  [auxvar_solution]
    type             = SolutionVectorFile
    var              = ' vel_x   vel_y   T_salt   T_solid    c1     c2     c3     c4     c5     c6      ad_C12
                        ad_U235 ad_U238  ad_Be9   ad_Li7 ad_F9  ad_Zr90  ad_Zr91  ad_Zr92  ad_Zr94   ad_Zr96'
    loading_var      = ' vel_x   vel_y   T_salt   T_solid    c1     c2     c3     c4     c5     c6      ad_C12
                        ad_U235 ad_U238  ad_Be9   ad_Li7 ad_F9  ad_Zr90  ad_Zr91  ad_Zr92  ad_Zr94   ad_Zr96'
    writing          = false
    execute_on       = 'INITIAL'
    folder           = '../../ex2_ss/ex23_fp_multiphysics/'
  []
[]
```

```
[AuxVariables]
  [T_salt]
    family           = MONOMIAL
    order            = CONSTANT
    block            = ${all_blocks}
  []
  [T_solid]
    family           = MONOMIAL
    order            = CONSTANT
    block            = ${solid_blocks}
  []
  [c1]
    order            = CONSTANT
    family           = MONOMIAL
    block            = ${salt_blocks}
  []
  [c2]
    order            = CONSTANT
    family           = MONOMIAL
    block            = ${salt_blocks}
  []
  [c3]
    order            = CONSTANT
    family           = MONOMIAL
    block            = ${salt_blocks}
  []
  [c4]
    order            = CONSTANT
    family           = MONOMIAL
    block            = ${salt_blocks}
  []
```

Restart Pronghorn Steady State Solution

- Remove initial conditions of the restarted variables.

- Restart steady state solution from exodus output file.

```
# ==========================================================
# GEOMETRY AND MESH
# ==========================================================
[Mesh]
  coord_type              = 'RZ'
  [fmg]
    type                  = FileMeshGenerator
    file                  = '../../ex2_ss/ex23_fp_multiphysics/msre_ss_out_flow_dnp0.e'
    use_for_exodus_restart = true
  []
[]
```

```
# ==========================================================
# FV VARIABLES
# ==========================================================
[Variables]
  [superficial_vel_x]
    type                  = PINSFVSuperficialVelocityVariable
    block                 = ${fluid_blocks}
    initial_from_file_var = superficial_vel_x
    initial_from_file_timestep = LATEST
  []
  [superficial_vel_y]
    type                  = PINSFVSuperficialVelocityVariable
    block                 = ${fluid_blocks}
    initial_from_file_var = superficial_vel_y
    initial_from_file_timestep = LATEST
  []
  [pressure]
    type                  = INSFVPressureVariable
    block                 = ${fluid_blocks}
    initial_from_file_var = pressure
    initial_from_file_timestep = LATEST
  []
  [T_fluid]
    type                  = INSFVEnergyVariable
    block                 = ${fluid_blocks}
    initial_from_file_var = T_fluid
    initial_from_file_timestep = LATEST
  []
```

```
[AuxVariables]
  [power_density]
    type                  = MooseVariableFVReal
    initial_from_file_var = power_density
    initial_from_file_timestep = LATEST
  []
  [power_density_fuel]
    type                  = MooseVariableFVReal
    initial_from_file_var = power_density_fuel
    initial_from_file_timestep = LATEST
  []
  [power_density_graph]
    type                  = MooseVariableFVReal
    initial_from_file_var = power_density_graph
    initial_from_file_timestep = LATEST
  []
  [fission_source]
    type                  = MooseVariableFVReal
    initial_from_file_var = fission_source
    initial_from_file_timestep = LATEST
  []
```

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