WHAT IS CLAIMED IS:

1. A rocket engine comprising a casing circumferentially extending around a longitudinal axis to circumscribe a combustion chamber–, the combustion chamber extending along the longitudinal axis and having an inlet and an outlet, the combustion chamber defining a fuel-receiving volume, the inlet fluidly connectable to a source of oxidizer, the outlet in fluid communication with an environment outside the combustion chamber for expelling combustion gases, a first fuel having a first solid propellant and a second solid fuel having a second solid propellant, the first and second fuels located within the combustion chamber andfuel-receiving volume, the solid fuel including a first solid fuel and a second solid fuel configured to be exposed to the oxidizer injected in the combustion chamber via the inlet, the first solid propellant having a inlet including at least one aperture defined through the casing and located axially between the fuel-receiving volume of the combustion chamber and the outlet of the combustion chamber relative to the longitudinal axis, the first solid fuel having a regression rate greaterless than that of the second solid propellantfuel when exposed to a same oxidizer flux such that a variation of an oxidizer flux is at least partially compensated by a variation of the regression rates of the first solid fuel and the second solid fuel, the first solid fuel and the second solid fuel are axially offset from one another relative to the longitudinal axis, the solid fuel burning along a regression direction parallel to the longitudinal axis, the first solid fuel located in front of the second solid fuel, and closer to the outlet of the combustion chamber than the second solid fuel, such that the first solid fuel is burned before the second solid fuel.

2. The rocket engine of claim 1, further comprisingwherein the solid fuel includes a third fuel having asolid fuel, the first solid fuel, the second solid fuel, and the third solid propellant, the first fuel, the second fuel, and the third fuel being disks disposed in series along a longitudinal axis of the rocket engine.

3. The rocket engine of claim 2, wherein the first solid fuel has a first viscosity, the second solid fuel has a second viscosity greaterless than the first viscosity, and the third solid fuel has a third viscosity greaterless than the second viscosity, the second solid fuel disposed between the first solid fuel and the third solid fuel.

4. The rocket engine of claim 3, wherein the rocket engine has a convergent-divergent nozzle in fluid communication with the outlet of the combustion chamber, the ~~third~~first solid fuel being closer to the nozzle than the ~~first~~ third solid fuel and the second ~~fuels~~solid fuel.

5. The rocket engine of claim 4, comprising an injector plate (1322) located at a converging section (1306a) of the convergent-divergent nozzle.

~~5.~~6. The rocket engine of claim 1, ~~further comprising a third fuel within the combustion chamber, the third fuel having a third solid propellant having a regression rate different that those of the~~ wherein the first solid fuel and the second solid ~~propellants~~fuel are cylinders.

7. The rocket engine of claim 6, wherein the first solid fuel and the second solid fuel have a face exposed to the oxidizer.

8. The rocket engine of claim 7, wherein the face is circular.

~~6.~~9. A rocket engine comprising a casing circumferentially extending around a longitudinal axis to circumscribe a combustion chamber, the combustion chamber extending along the longitudinal axis and having an inlet and an outlet, the combustion chamber defining a fuel-receiving volume, the inlet fluidly connectable to a source of ~~an~~ oxidizer, the outlet in fluid communication with an environment outside the combustion chamber for expelling combustion gases, a solid ~~propellant~~ fuel located within the fuel-receiving volume, the inlet including at least one aperture defined through the casing and located axially between the fuel-receiving volume of the combustion chamber and the outlet of the combustion chamber relative to the longitudinal axis, the solid ~~propellant~~ fuel ~~having a face~~ configured to~~, in use,~~ be exposed to the oxidizer~~, the solid propellant fuel~~ injected in the combustion chamber via the inlet and having a rheological property varying therethrough along a regression direction being parallel to the longitudinal axis, a first portion of the solid fuel having a regression rate less than that of a second portion of the solid fuel when exposed to a same oxidizer flux such that a variation of an oxidizer flux is at least partially compensated by a variation of the regression rates.

~~7.~~10. The rocket engine of claim ~~6~~9, wherein the rheological property is a viscosity of the solid ~~propellant~~fuel, the viscosity decreasing in the regression direction.

~~8. The rocket engine of claim 6 or 7, wherein the regression direction is normal to the face of the solid propellant fuel.~~

~~9. The rocket engine of any one of claims 6 to 8, wherein the solid propellant fuel is a tube disposed concentrically within the combustion chamber, the face being an inner cylindrical face of the tube, the regression direction being a radial direction relative to a longitudinal axis of the combustion chamber, or wherein the solid propellant fuel is a cylinder, the face being a circular end face of the cylinder, the regression direction being an axial direction relative to a longitudinal axis of the combustion chamber..~~

~~10. A rocket engine comprising: a combustion chamber having a chamber inlet for receiving an oxidizer and a chamber outlet for expelling combustion gases in an environment outside the combustion chamber; a manifold having a manifold inlet fluidly connectable to a source of the oxidizer and a manifold outlet; a catalyst having a catalyst inlet fluidly connected to the manifold outlet and a catalyst outlet; and an injector plate having a injector inlet fluidly connected to the catalyst outlet and an injector outlet fluidly connected to the chamber inlet.~~

~~11. The rocket engine of claim~~ 10, wherein the ~~catalyst is located between the manifold and the injector plate.~~

~~12. The rocket engine of claim 10 or 11, wherein the injector plate includes a plurality of apertures extending therethrough, at least one of the plurality of apertures have aperture inlets being circumferentially offset from aperture outlets relative to a longitudinal axis of the rocket engine for creating a swirl in the oxidizer.~~

~~13. The rocket engine of any one of claims 10 to 12, wherein the catalyst~~ rocket engine has a ~~mesh, the mesh coated with silver.~~

~~14.~~11. ~~The rocket engine of any one of claims 10 to 13, wherein the rocket engine includes a~~ convergent-divergent nozzle ~~located downstream of the combustion chamber, the injector plate, the manifold, and the catalyst being annular and extending circumferentially around a convergent section of the convergent-~~

~~divergent nozzle.~~in fluid communication with the outlet of the combustion chamber.

12. The rocket engine of claim 11, comprising an injector plate (1322) located at a converging section (1306a) of the convergent-divergent nozzle.

13. The rocket engine of any one of claims 9 to 12, wherein the solid fuel is a cylinder.

~~15.~~14. The rocket engine of claim ~~12, wherein at least one of the plurality of apertures has an aperture inlet being circumferentially offset from an aperture outlet relative to a longitudinal axis of the rocket engine for creating a swirl in the~~ 13, wherein the solid fuel has a face exposed to the oxidizer.

~~16. The rocket engine of any one of claims 10 to 15, wherein the injector plate is a disk and wherein the catalyst includes a mesh being disk-shaped, the mesh having at least two faces, one of the at least two faces located proximate the injector plate and defining the outlet of the catalyst, the manifold extending over the other of the at least to faces, the other of the at least two faces defining the inlet of the catalyst.~~

~~17. The rocket engine of any one of claims 10 to 16, wherein the injector plate extends circumferentially all around a longitudinal axis of the rocket engine, the catalyst being annular and extending around the injector plate and located radially outwardly of the injector plate relative to a longitudinal axis of the rocket engine, the catalyst having a mesh having at least two faces, one of the at least two faces located proximate the injector plate and defining the outlet of the catalyst, the manifold extending over the other of the at least to faces, the other of the at least two faces defining the inlet of the catalyst.~~

~~18. An integrated injector assembly for injecting an oxidizer within a combustion chamber of a rocket engine, comprising an inner wall defining an inlet fluidly connectable to a source of an oxidizer, an outer wall spaced apart from the inner wall to define a cavity therebetween, the outer wall defining an outlet for injecting a catalyzed oxidizer within the combustion chamber, and a catalyst located within the cavity.~~

19. The integrated injector assembly of claim 18, wherein the inner wall and the outer wall are annular and circumferentially extend all around a longitudinal axis, the inner wall located radially inwardly of the outer wall, the cavity and the catalyst being annular and extending around the longitudinal axis.

20. The integrated injector assembly of claim 18 or 19, wherein the outlet includes a plurality of apertures extending through the inner wall and circumferentially distributed around the longitudinal axis, at least one of the plurality of apertures having an exit flow axis having a circumferential component relative to the longitudinal axis.

21. A hybrid rocket engine system, comprising: an oxidizer tank containing a liquid oxidizer; a rocket engine having a combustion chamber operatively connected to the oxidizer tank; a solid propellant fuel within the combustion chamber; a nozzle fluidly connected to the combustion chamber, the nozzle having a convergent section and a divergent section downstream of the convergent section; and a thrust vector control device operatively connected to the divergent section of the nozzle and operable to inject a fluid through at least one aperture defined through the divergent section for controlling a direction of a thrust generated by the rocket engine.

22. The hybrid rocket engine system of claim 21, wherein the thrust vector control device includes at least one valve fluidly connected to the at least one aperture via at least one conduit, the conduit extending radially away from a wall of the divergent section relative to a longitudinal axis of the rocket engine.

23. The hybrid rocket engine system of claim 22, wherein the at least one conduit and the wall of the divergent section are monolithic.

24. The hybrid rocket engine system of any one of claim 21 to 23, further comprising a cooling system coupled to the divergent section of the nozzle, the cooling system having a coolant conduit extending around the divergent section, the coolant conduit having a conduit inlet fluidly connected to the oxidizer tank and a conduit outlet fluidly connected to the combustion chamber.

~~25. A divergent section of a convergent-divergent nozzle of a rocket engine, the divergent section having a monolithic body, the monolithic body defining a wall extending circumferentially around a central axis, at least one aperture extending through a thickness of the wall, the monolithic body further defining at least one conduit protruding away from the wall and connected to the at least one aperture.~~

~~26. The divergent section of claim 25, wherein the at least one aperture and the at least one conduit include a plurality of apertures and conduits circumferentially distributed around a central axis of the divergent section.~~

~~27. The divergent section of claim 25 or 26, wherein the monolithic body further defines a coolant passage extending circumferentially around a central axis of the divergent section, the coolant passage located between inner and outer faces of the monolithic body.~~

~~28. The divergent section of any one of claims 25 to 27, wherein the at least one aperture has a peripheral surface having a convergent-divergent shape.~~

15. ~~The divergent section of any one of claims 25 to 28, further comprising a coating of a composite material, the coating disposed on an inner face of the wall.~~The rocket engine of claim 14, wherein the face is circular.

~~29.~~