Amusement Attraction Fluid Control System

Field of the Invention

The invention relates generally to amusement attractions, and in particular fluid based attractions.

Background of the Invention

In the past few decades, water-based amusement rides have become increasingly popular. Such rides can provide similar thrills to roller-coaster rides, with the additional features of the cooling effect of water and the excitement of being splashed.

The most common water-based amusement rides are flume-style waterslides in which a participant slides along a channel or "flume", either on his or her body, or on or in a vehicle. Water is provided in the flume to provide lubrication between the body/vehicle and the flume surface, and to provide the above-mentioned cooling and splashing effects. Typically, the motion of the participant in the flume is controlled predominantly by the contours of the flume (hills, valleys, turns, drops, etc.) in combination with gravity.

As thrill expectations of participants have increased, demand for greater control of participants' movement in the flume has correspondingly increased. Thus various techniques have been applied to accelerate or decelerate participants by means other than gravity. For example, a participant may be accelerated or decelerated using powerful water jets. Other rides use a conveyor belt to convey a participant to the top of a hill the participant would not otherwise crest on the basis of his or her momentum alone.

Water rides are very popular in hot climates where the cooling effect of water allows participants to enjoy the

outdoors when temperatures would otherwise make the outdoor experience unpleasant. Such locations pose challenges because they often have limited water resources, are prone to drought, and may have costly energy. This situation is a deterrent to the construction of water rides which require large volumes of water to operate and utilize significant energy reserves to move the water through the water rides.

Summary of the Invention

Disclosed herein is an amusement attraction fluid control system comprising: a fluid source; at least one pump; at least one fluid feature; a plurality of conduits interconnecting the fluid source and the at least one pump to the at least one fluid feature; and a controller; wherein the at least one pump is configured to pump fluid through the conduits to the at least one fluid feature; and wherein the controller is adapted to control the at least one pump to deliver fluid to each respective fluid feature.

In some embodiments, the amusement attraction fluid control system further comprises at least one variable frequency drive intermediate the controller and the at least one pump for controlling each of the at least one pump based on input received from the controller.

In some embodiments, the amusement attraction fluid control system further comprises at least one sensor wherein the at least one sensor provides input to the controller.

In some embodiments, the at least one sensor comprises at least one first sensor adapted to detect at least one feature of a participant.

In some embodiments, the feature is at least one of location and velocity.

In some embodiments, the at least one sensor comprises at least one second sensor adapted to detect at least one fluid flow property.

In some embodiments, the at least one fluid flow property is at least one of fluid pressure and rate of fluid flow.

In some embodiments, the at least one fluid feature comprises a plurality of fluid features and the at least one pump comprises a plurality of pumps and wherein each of the plurality of fluid features has at least one associated pump of the plurality of pumps.

In some embodiments, each of the at least one pump is adapted to increase fluid flow rate from the associated fluid feature when the participant is adjacent to the fluid feature and to decrease fluid flow rate from the associated fluid feature when the participant is at a distance from the fluid feature.

In some embodiments, the amusement attraction fluid control system further comprises a variable frequency drive associated with each of the at least one pump for controlling the fluid flow rate from the at least one pump.

Disclosed herein is a waterslide section comprising the amusement attraction water control system and a sliding surface wherein each fluid feature is a water feature and each at least one pump is adapted to increase flow of water to each respective water feature as a participant slides toward the respective water feature and to decrease flow of water to the respective water feature as the participant slides away from the water feature.

In some embodiments, the fluid features are water spray sources.

Disclosed herein is an amusement attraction comprising the amusement attraction fluid control system and a water slide wherein the plurality of fluid features are associated with the water slide.

Disclosed herein is an amusement attraction comprising the amusement attraction fluid control system and a water play structure wherein the plurality of fluid features are associated with the water play structure.

Disclosed herein is a water play attraction water control system comprising: a water source; a pump; a plurality of water features; a plurality of conduits interconnecting the water sources and pump to the plurality of water features; and each of the plurality of water features having a respective associated valve; wherein the pump is configured to pump water through the conduits to the water features; wherein each respective associated valve is adapted to open to deliver water to each respective water feature.

In some embodiments, the amusement attraction water control system further comprises at least one sensor wherein at least one of the associated valves is movable between open and closed positions based on input from the at least one sensor.

In some embodiments, the at least one sensor comprises a plurality of sensors wherein each respective associated valve has a respective associated sensor.

According to a first aspect of the present invention, there is provided an amusement ride vehicle motion control system comprising: an upwardly extending channel; a plurality

of fluid spray sources positioned to spray fluid over the upwardly extending channel to exert force on the vehicle to boost the vehicle up the upwardly extending channel; at least one first sensor adapted detect when the amusement ride vehicle enters a zone of the upwardly extending channel; at least one pump associated with the plurality of fluid spray sources; and a controller adapted to increase the fluid flow by the at least one pump to the respective fluid spray sources in response to an amusement ride vehicle entering the zone.

In some embodiments, the amusement ride vehicle motion control system further comprises at least one second sensor adapted to detect when the amusement ride vehicle leaves the zone of the channel, the controller being adapted to reduce the pump output to decrease the flow from the fluid spray source in response to the amusement ride vehicle exiting the zone.

In some embodiments, the amusement ride vehicle motion control system further comprises: a second plurality of fluid spray sources positioned to spray fluid over the channel; at least one third sensor adapted detect when the amusement ride vehicle enters a second zone of the channel at least one second pump associated with the second plurality of fluid spray sources; and the controller being adapted to increase the fluid flow by the at least one second pump to the respective second plurality of fluid spray sources in response to an amusement ride vehicle entering the zone.

In some embodiments, the respective pumps are connected to the controller by a variable frequency drive, wherein the respective variable frequency drives are adapted to control the rate of the respective pumps

In some embodiments, the channel comprises a sliding surface and the vehicle is adapted to slide on the sliding surface.

In some embodiments, the channel is adapted to hold sufficient fluid to float the vehicle and the vehicle is adapted to float in the channel.

In some embodiments, the channel is upwardly angled and the fluid spray sources are positioned to exert force on the vehicle to boost the vehicle up the channel.

In some embodiments, the channel is horizontal and the fluid spray sources are positioned to exert force on the vehicle to accelerate the vehicle along the channel.

According to a second aspect of the present invention, there is provided a method of affecting the motion of a vehicle in a sliding on a waterslide comprising: providing an upwardly extending channel in the waterslide; positioning a plurality of water spray sources to spray water at a vehicle in the upwardly extending channel to exert force on the vehicle to boost the vehicle up the upwardly extending channel; sensing when the vehicle enters the upwardly extending channel; increasing a rate of a pump to spray water from the water spray sources at a pressure and flowrate to affect motion of the vehicle.

In some embodiments, the method further comprises sensing when the vehicle is exiting the channel; and decreasing the rate of the pump to reduce the spray water from the water spray sources.

In some embodiments, the method further comprises operating a variable frequency drive to control the rate of the pump.

In some embodiments, the channel is upwardly angled, the method comprising operating the fluid spray sources to exert force on the vehicle to boost the vehicle up the channel.

In some embodiments, the channel is horizontal, the method comprising operating the fluid spray sources to exert force on the vehicle to accelerate the vehicle along the channel.

Disclosed herein is an amusement ride vehicle comprising: a body and at least one of recesses and protrusions on a perimeter surface of body, the at least one of recesses and protrusions defining fluid impact surfaces, the fluid impact surfaces being at an angle to an intended direction of motion of the vehicle to affect motion of the vehicle when the fluid impact surfaces are impacted by a fluid.

In some embodiments, at least a portion of an underside of the body is adapted to slide on a sliding surface.

In some embodiments, the vehicle is adapted to float in a fluid.

In some embodiments, the at least one of recesses and protrusions comprise a plurality of recesses or a plurality of protrusions spaced along opposite sides of the vehicle body.

In some embodiments, the vehicle comprises outer sidewalls and a bottom surface and the plurality of recesses or the plurality of protrusions do not extend outward past the

CLAIMS:

1. An amusement ride vehicle motion control system comprising:

an upwardly extending channel;

a plurality of fluid spray sources positioned to spray fluid over the upwardly extending channel to exert force on the vehicle to boost the vehicle up the upwardly extending channel;

at least one first sensor adapted detect when the amusement ride vehicle enters a zone of the upwardly extending channel;

at least one pump associated with the plurality of fluid spray sources; and

a controller adapted to increase the fluid flow by the at least one pump to the respective fluid spray sources in response to an amusement ride vehicle entering the zone.

2. The amusement ride vehicle motion control system of claim 1 further comprising at least one second sensor adapted to detect when the amusement ride vehicle leaves the zone of the upwardly extending channel, the controller being adapted to reduce the pump output to decrease the flow from the fluid spray source in response to the amusement ride vehicle exiting the zone.

3. The amusement ride vehicle motion control system of claim 2 further comprising:

a second plurality of fluid spray sources positioned to spray fluid over the channel;

at least one third sensor adapted detect when the amusement ride vehicle enters a second zone of the upwardly extending channel at least one second pump associated with the second plurality of fluid spray sources; and

the controller being adapted to increase the fluid flow by the at least one second pump to the respective second

plurality of fluid spray sources in response to an amusement ride vehicle entering the zone.

4. The amusement ride vehicle motion control system of any one of claims 1 to 3, wherein the respective pumps are connected to the controller by a variable frequency drive, wherein the respective variable frequency drives are adapted to control the rate of the respective pumps.

5. The amusement ride vehicle motion control system of any one of claims 1 to 4 wherein the upwardly extending channel comprises a sliding surface and the vehicle is adapted to slide on the sliding surface.

6. A method of affecting the motion of a vehicle in a sliding on a waterslide comprising:

providing an upwardly extending channel in the waterslide;

positioning a plurality of water spray sources to spray water at a vehicle in the upwardly extending channel to exert force on the vehicle to boost the vehicle up the upwardly extending channel;

sensing when the vehicle enters the upwardly extending channel;

increasing a rate of a pump to spray water from the water spray sources at a pressure and flowrate to affect motion of the vehicle.

7. The method of claim 6 further comprising sensing when the vehicle is exiting the upwardly extending channel; and decreasing the rate of the pump to reduce the spray water from the water spray sources.

8. The method of claim 6 or claim 7 further comprising operating a variable frequency drive to control the rate of the pump.