Summary

According to a first aspect, there is provided a rotating machine, comprising: a first component having a first component surface subject to radial displacement during operation of said rotating machine, said first component surface being defined by a first diameter; a second component having a second component surface spaced apart from said first component surface, said second component surface being defined by a second diameter different from said first diameter; a squeeze film damper disposed in a cavity defined between said first component surface and said second component surface, said squeeze film damper being structured to provide damping based on said radial displacement; and a seal disposed adjacent to said squeeze film damper, said seal having a first sealing surface and a second sealing surface, wherein said first sealing surface is structured to seal against said first component surface at said first diameter, and wherein said second sealing surface is structured to seal against said second component surface at said second diameter.

According to a second aspect, there is provided a gas turbine engine, comprising: a rotating engine structure; a static engine structure having a static structure pilot diameter; a rolling element bearing structured to transmit a load from said rotating engine structure to said static engine structure, said rolling element bearing having an inner race and an outer race, said inner race having an inner race pilot diameter and said outer race having an outer race pilot diameter, wherein said static structure pilot diameter and one of said inner race pilot diameter and said outer race pilot diameter form a cavity therebetween; and a damping system for damping said load, said damping system including: a squeeze film damper disposed in said cavity,

said cavity also containing a viscous damping fluid, wherein said squeeze film damper is operative to provide viscous damping of said load using said viscous damping fluid based on clearances between said static engine structure at said static structure pilot diameter and said rolling element bearing at said one of said inner race pilot diameter and said outer race pilot diameter; and a seal disposed at least partially in said cavity, said seal having a first sealing surface and a second sealing surface, wherein said first sealing surface is structured to seal against said static engine structure at said static structure pilot diameter, and wherein said second sealing surface is structured to seal against said rolling element bearing at said one of said inner race pilot diameter and said outer race pilot diameter.

According to a third aspect, there is provided a rotating machine, comprising: a rotating structure; a static structure having a static structure pilot diameter; a rolling element bearing structured to transmit a variable load from said rotating structure to said static structure, said rolling element bearing having an inner race and an outer race, said inner race having an inner race pilot diameter and said outer race having an outer race pilot diameter, wherein said static structure pilot diameter and one of said inner race pilot diameter and said outer race pilot diameter form a cavity therebetween; means for damping said variable load; and means for sealing said means for damping, said means for sealing being operative to seal between said static structure pilot diameter and said one of said inner race pilot diameter and said outer race pilot diameter.

According to a fourth aspect, there is provided a damper system for rotating machinery, comprising: a squeeze film damper disposed in a cavity defined between a diameter of a static structure of said rotating machinery and one of an inner race diameter and an outer race diameter of a rolling element bearing of said rotating machinery, said cavity also containing a viscous damping fluid, wherein said squeeze film damper is operative to provide viscous damping of a load using said viscous damping fluid based on clearances between said static structure diameter and said one of said inner race diameter and said outer race diameter; and a seal disposed at least partially in said cavity, said seal having a first sealing surface and a second sealing surface, wherein said first sealing surface is structured to seal against said static structure at said diameter of said static structure, and wherein said second sealing surface is structured to seal against said rolling element bearing at said one of said inner race diameter and said outer race diameter.

One embodiment of the present invention is a damping system for rotating machinery such as gas turbine engines. Other embodiments include apparatuses, systems, devices, hardware, methods, and combinations for damping systems. Further embodiments, forms, features, aspects, benefits, and advantages of the present application shall become apparent from the description and figures provided herewith.