

TOWBARLESS AIRPLANE TUG**Abstract**

A towbarless airplane tug configured for receiving a landing gear of an airplane and towing it thereby is provided. The tug comprises a chassis configured for receiving thereon at least a portion of the landing gear, a propulsion arrangement configured to move the tug in a direction along a trajectory, at least one force sensor configured to measure, directly or indirectly, a force exerted by the chassis on the landing gear in at least the direction due to a speed differential between the tug and the airplane, and a controller in communication with the force sensor and being configured to alter one or more parameters of movement of the tug such that the force exerted by the chassis on the landing gear is maintained below a predetermined value. The propulsion arrangement comprises a variable angle swash plate hydraulic pump coupled to a variable angle swash plate hydraulic motor and to a controllable bypass path valve, configured such that a hydraulic fluid circulates between the pump and the motor so as to activate the propulsion arrangement to increase at least one of the speed and the traction force of the tug when the bypass path is in a closed state, and at least most of the hydraulic fluid circulates across the motor via the bypass path valve so as to reduce at least one of a rotational speed and traction force of the tug when the bypass path is in a opened state. The controller alters the parameters by regulating at least the power available to the propulsion arrangement, the pump and motor swash-plates, and the state of the bypass path valve.

Figure 1A