Since the process medium looses pressure throughout the separation stages, the later stages separated process medium must be boosted to reach the pressure of the first stage separated process medium. One current solution for boosting the pressure of the later stage separated process medium is to use an ejector that uses another pressurized medium as motion fluid. However, the ejector solution has the disadvantages of low efficiency and mixing of motion fluid with the driven medium.

Conventional centrifugal or screw pumps have a limited tolerance to sand. Current solution is either to let the sand go through the pump and use very high grade materials and coatings, or if the sand production is very high, the sand can be separated out upstream the pump and bypassed by means of an ejector. This ejector system is rather complex and require high flow of motion fluid.

It is therefore a need for a different solution to boost a fluid subsea.

The aim of the invention is to provide a simpler system that does not require dedicated supply of utilities (e.g. electric power and barrier fluid) from an external host, and hence will be more or less autonomous. It is also an aim of the invention to provide a system that is robust to sand and capable of pumping viscous sand slurries. This is achieved by using a subsea available pressurized fluid as a motive fluid for the pump, that the pump is a reciprocating pump and that it comprises means for creating pressure pulses in the motive fluid for operation of the pump.

In an aspect of the invention, there is provided a subsea pumping system for use in a remote location such as a subsea hydrocarbon production facility, comprising a source for high pressure fluid; a reciprocating or oscillating fluid driven pump, and a sequential valve able to transform a steady fluid pressure to a pulsating fluid pressure in a motive fluid for excitation of the fluid driven pump, the sequential valve is fitted in a branch pipeline between the source for high pressure fluid and the fluid driven pump, wherein the high pressure fluid in a pipeline, used as a motive fluid for the fluid driven pump, is the hydrocarbon production produced from a well, and wherein the source for the motive fluid is a compressor using produced gas.

The working principle of the autonomous pump invention is to bleed off some process fluid from a high pressure space to a low pressure space. In the bleed-off line it shall be fitted a valve, or arrangement of valves (hereafter named sequencing valve) which working task is to transform a steady fluid pressure to a pulsating fluid pressure for excitation of a reciprocating or oscillating pump.

Preferably the reciprocating pump is a piston type, diaphragm type or hose diaphragm type. Especially diaphragm pumps and hose diaphragm pumps are robust to sand and particles.

The means for providing the reciprocating driving fluid is a sequential valve, preferably a rotating valve or a shuttle valve. It can also be an arrangement of several valves. One sequencing valve (or valve arrangement) can be made to operate one single pump or multiple pumps.

In one embodiment of the invention where there is sand in the well fluids, the sand is separated out in a de-sander and pumped using the reciprocating pump while the clean fluid is used as the motive fluid for the pump.