Title: Supercritical fluid recycle for surge control of CO_2 centrifugal compressors

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Highlights

- The selection between hot and cold gas recycle for surge protection must take into account the effect of the recycle temperature on the stability of the compression system
- The cold gas recycle configuration guarantees the thermal integrity of the machine however the performance of the pressure control is not as good and power consumption is higher
- The hot gas recycle configuration has a simpler process layout and lower power consumption however can oscillate due to the effect of the compressor inlet conditions on the location of surge
- The margin between the operating point of the compressor and the surge line changes with time and it is a function of the inlet conditions of the compressor
- A subcritical compressor operating in full recycle mode is able to recycle 22.64 % more gas by means of a cold gas recycle rather than a hot gas recycle, while in a supercritical compressor this amount rises to 81.50 %.