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Extractor for valuables from solutions

Continuous extraction of dissolved materials from a fluid stream

Centrifugal extractors are widely used and efficient equipment in the separation of multiphase mixtures. They offer several advantages, such as low residence time and high mass transfer coefficient and area. There are two main categories of centrifugal extractors:

- Annular centrifugal extractors (ACE): consist of two coaxial cylinders. The mixing occurs between the two cylinders, then the mixture is separated inside the inner cylinder. This is due to centrifugal force, since the inner cylinder is rotating at high speed. The main drawback of the ACE is that it lacks an internal structure for controlling mixing (mixing intensity) and separation (fluid flow and back-mixing).
- Decanter extractors (DE): in these extractors, the phases are mixed in an external mixer and then the mixture is pumped into a rotating drum where it is separated by centrifugal force. Usually, there is an internal structure inside the drum (e.g. helix) to increase the residence time and avoid back-mixing.

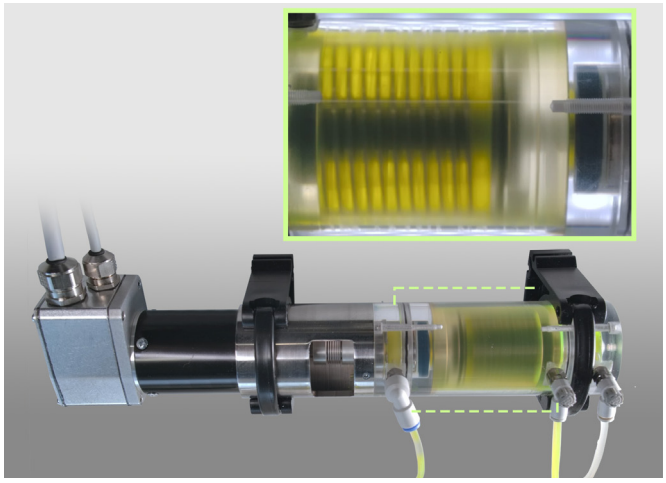
Objectives

The research group Separations Engineering and Simulation at the ICEBE, TU Wien aims to provide a new system to improve mixing/extraction and separation quality by controlling intensity and back-mixing. At the same time the newly designed device aims to minimize dead volume and the number of required parts, and to provide more efficient and robust operation, e.g. less noise and vibration.

Solution

To achieve controlled-stream conditioning in a compact design, the researchers started planning the device around a single shaft which enabled them to use a minimized design. The reduced number of components involved and direct coupling of the device to the drive helps to minimize vibration and noise. Mixing intensity, separation quality and also residence time inside the device can be adjusted by adapting internal geometries and operating conditions.

Using this new technology, the intended components are



transferred in a more controlled way from the primary phase to the main stream using a compact combined design, which reduces the number of mechanical parts, space needed and the dead volume. It also increases separation efficiency, and makes the building, operation and maintenance of the device more time-, cost- and space-efficient.

Advantages

- Separation and extraction of organic components from a flow stream
- Hydrodynamic principle – with centrifugal extractor on a single shaft
- Minimized required parts and size, minimal dead volume and wake space
- Control of extraction intensity and separation quality by shaft speed and residence time
- Intensity and residence time determined by internal geometries
- Multi-stage extractions possible in one unit and on a single shaft
- High extraction efficiency (mixing and separation)
- Compact, reliable, and durable by design
- Most cost-effective in production, operation and maintenance

Applications

- Food, pharmaceutical, chemical, petroleum industries
- Research facilities and production plants
- Chemical engineering
- Measurement systems

Notes

Kontakt

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