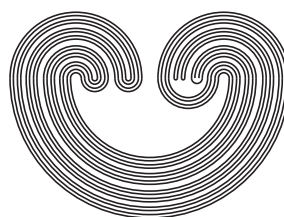


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# TOPOLOGY PROCEEDINGS



Volume 61, 2023

Pages 31–47

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## APPROACH THEORY AND POINTFREE CONVERGENCE

by

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Electronically published on December 17, 2021

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**ISSN:** (Online) 2331-1290, (Print) 0146-4124

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## APPROACH THEORY AND POINTFREE CONVERGENCE

FRÉDÉRIC MYNARD

*In memory of Ralph Kopperman*

**ABSTRACT.** The purpose of this note is to show that convergence approach spaces in the sense of [9] can be seen as instances of special convergence lattices (specifically, convergence frames) in the sense of [6], hence fitting them in a general theory of pointfree convergence. Interestingly, the standard construction of the space of points (or spectrum) of a convergence approach space seen as a convergence frame returns the structure of the original convergence approach space, but packaged as a convergence space. The notion of a *centered* convergence lattice appears even more clearly as the natural pointfree analog of the point-axiom: it was already observed in [6] that it encapsulates the point-axiom of convergence spaces and it turns out that it also captures the point-axiom for convergence approach spaces. This is half of a characterization of those convergence frame structures on a function space  $[0, \infty]^X$  that represent a convergence approach space structure on  $X$ . Notions of closed and of open elements in the pointfree convergence setting turn out to entirely depend, in the case of a convergence approach space, on the reflection on convergence spaces.

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2020 *Mathematics Subject Classification.* 06D22, 54A20, 54B30, 18B05, 18F70.

*Key words and phrases.* Approach theory, convergence lattice, pointfree convergence, convergence approach space, centered convergence lattice,  $**$ -regularity.

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