Conjecture 49. $\uparrow^{\mathsf{FCD}} A \left[\prod^{(C)} f \right] \uparrow^{\mathsf{FCD}} B \Leftrightarrow \uparrow^{\mathsf{RLD}} A \left[\prod^{(A)} f \right] \uparrow^{\mathsf{RLD}} B$ for every indexed family f of funcoids and $a \in \mathscr{P} \prod_{i \in \operatorname{dom} f} \operatorname{Src} f_i$, $a \in \mathscr{P} \prod_{i \in \operatorname{dom} f} \operatorname{Dst} f_i$.

Conjecture 50. $\left\langle \prod^{(A)} f \right\rangle \uparrow^{\mathsf{RLD}} X = (\mathsf{RLD})_{\mathrm{in}} \left\langle \prod^{(C)} f \right\rangle \uparrow^{\mathsf{FCD}} X$ for every indexed family f of funcoids and a suitable set X.

Compactness and Heine-Cantor theorem

Theorem 51. Let f be a T_1-separable compact reflexive symmetric funcoid and g be a reloid such that

1. $(\mathsf{FCD}) g = f$;
2. $g \circ g^{-1} \sqsubseteq g$.

Then $g = \langle f \times f \rangle^{*} \Delta$.

About the above conjecture see also

http://www.openproblemgarden.org/op/direct_proof_of_a_theorem_about_compact_funcoids

$\forall \mathcal{F} \in \mathfrak{F}: (\mathcal{F} \cap \operatorname{im} f \neq \emptyset \Rightarrow \exists \alpha: \{\alpha\} \, [f] \, \mathcal{F})$ or equivalently

$$\forall \mathcal{F} \in \mathfrak{F}: (\langle f^{-1} \rangle \mathcal{F} \neq \emptyset \Rightarrow \exists \alpha: \{\alpha\} \subseteq \langle f^{-1} \rangle \mathcal{F})$$

is a possible definition of *compact* funcoid. (A special case of this definition was hinted by Victor Petrov.) How this is related with open covers and finite covers from the traditional definition of compactness? Does compactness imply completeness?

Generalize Heine-Cantor theorem for funcoids and reloids.

Category theory related

Conjecture 52. The categories Fcd and Rld are cartesian closed (actually two conjectures).

Bibliography

[1] Victor Porton. Distributivity of compositon with a principal reloid over join of reloids. At http://www.mathematics21.org/binaries/decomposition.pdf.