On the Friedrichs and the Kreĭn-von Neumann extension of nonnegative relations

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abstract
Some characteristic properties for the Friedrichs and the Kreĭn-von Neumann extension of a nonnegative linear relation in a Hilbert space are established, including criteria which describe the range and the domain of these extensions as well as of their square roots. By systematically allowing linear relations in the descriptions makes it possible to translate results from the domain to the range and vice versa by inversion of the relations. Applications include an analog for Kreĭn's uniqueness criterion concerning the nonnegative self-adjoint extensions in the case of nonnegative linear relations.