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Confinement time of ion kinetic energy in a controlled nuclear fusion system CHIPING CHEN, JAMES R. BECKER, JR., JAMES J. FARRELL, Beyond Carbon Energy, LLC — The single most important scientific question in fusion research is confinement in a fusion plasma. A theoretical model is presented for the confinement time of ion kinetic energy in a material where fusion reactions occur. After a review of ion stopping in neutral materials, a formula is derived for the confinement (or decaying) time of ion kinetic energy in neutral materials. Under the assumption that ion stopping cross section in a neutral material is comparable that in a plasma, an estimate is obtained for the confinement time of ion kinetic energy in a D-T plasma, which is orders of magnitude lower than what is required in the Lawson criterion. The estimate is compared with indirect indications from experiments at TFTR and Wendelstein 7-X. An experiment program is proposed for studying and improving the confinement time of ion kinetic energy in plasmas.

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